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OUR HERITAGE THE SEA

OTHER WORKS

BY

FRANK T. BULLEN

THE CRUISE OF THE "CACHALOT"
IDYLLS OF THE SEA
THE LOG OF A SEA-WAIF
WITH CHRIST AT SEA
THE MEN OF THE MERCHANT SERVICE
A SACK OF SHAKINGS
THE APOSTLES OF THE SOUTH-EAST
DEEP-SEA PLUNDERINGS
A WHALEMAN'S WIFE
SEA-WRACK
SEA PURITANS
CREATURES OF THE SEA
BACK TO SUNNY SEAS
SEA SPRAY
A SON OF THE SEA
FRANK BROWN, SEA APPRENTICE

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BRITAIN BECAME ABSOLUTELY MISTRESS OF THE SEA.'

Frontispiece.

INTRODUCTION

THE idea of writing a book, which within the narrow limits demanded by the hard-pressed reader of to-day should give a comprehensive view of the various aspects of our heritage the sea, has been present to my mind ever since I first dared to address the public on sea matters. I do not believe that it can be possible for any one to feel more deeply than I do the urgent necessity of awakening our people generally to the importance of the ocean to them, and certainly no one can more sadly realize the difficulty of the task. For not only is the subject an enormous one, embracing as it does every department of science and political economy, but in its exposition a writer must calculate upon meeting with that terrible dead weight of apathy, of taking things for granted, which is characteristic of the British people generally. There is only one advantage obvious in the treatment of this great subject—its freedom from controversial topics, the discussion of which is so often attended with a bitterness that obscures the vital points at issue. On the other hand the general reader is very prone to fight shy of books upon the sea which are not avowedly fiction, fearing the introduction of technicalities which he cannot understand, and of which he will not take the trouble to ascertain the meaning. This consideration was

very sternly borne in upon my experience in connection with my book, "The Men of the Merchant Service." My object in writing that book was solely to acquaint the general public with the work of our merchant seamen of all grades, by giving in the most untechnical terms a description of their various duties, interspersed with illustrative anecdotes, mostly drawn from personal experience. Never was a book more favourably received by the critics; out of hundreds of reviews, I do not recall one that was not eulogistic, while many of the critiques in the great reviews were couched in language calculated to turn a poor author's head. But still more gratifying was the reception the book met with from seamen of every grade, both active and retired. These men are naturally the very keenest critics of books about the sea, because they know the subject so well, and are consequently intolerant of amateur writing thereon. Most gratefully do I record that from all parts of the world nautical men have written to me, praising the work in the highest terms; and chiefly do I remember and cherish the long letter of commendation which I received from a man whom I, in common with most of my fellow-seamen, regard as the greatest all-round merchant seaman of his day, Captain S. T. S. Lecky, author of "Wrinkles." This gifted man, from a bed of pain attendant upon the disease which shortened his most valuable life, was good enough to say that, finding my book during a period of enforced leisure, he had searched it with the most jealous care, and had been unable to find the slightest error of technique or detail, which, of course, was most gratifying to me.

But, in the result, I have to say that the sale of this book, which I take it is the best test of the appreciation of the public, has been utterly insignificant. It has not gone beyond the second small edition in seven years, and since by general consent of all its readers it is written in an interesting way and has no dry pages, I think it may justly be inferred that the public do not want to hear about the Mercantile Marine, are entirely indifferent to the status of its members, and are content to take all its benefits to them as they take light and air—as coming in the course of nature, with the management and production of which they have no concern. This opinion is borne out by my experience throughout our islands as a lecturer on the subject. Talking from the platform, I can always interest my hearers in any phase of the sea without introducing the slightest element of fiction; but I cannot induce them to read the matter up, nor can I ever find any evidence of the subject having been studied, however cursorily, except by persons who are, or have been, directly connected with it. This I cannot fail to lament as being, in view of the paramount importance of the subject, quite unnatural and unnecessary, more especially when I see the intense interest manifested by people of all ranks and grades of education in games such as football, cricket, and bridge, and the amount of earnest thought expended upon acquiring information concerning them, not only in their present, but in their past history. Moreover, I know personally working men who have lavished upon horse-racing an amount of brain-power that, legitimately applied, would have made their fortune. Such men will give you, at a

moment's notice, the names, pedigrees, owners, riders, and starting-prices of the winners of all the "classic" races for a dozen years back, throwing in with mental exuberance many extraneous details concerning these events. Yet such men could not, if their freedom depended upon it, give you the faintest idea of what the merchant service means to the country at large, much less to their own particular trade.

This being so (and I have not the slightest fear of its being questioned), I feel that no apology is needed for my present attempt to present, in a series of sketches, the salient points concerning our heritage the sea, while fully conscious of my many limitations and scanty equipment for so important a task. In this respect I may say that I have endeavoured to summarize in readable fashion the substance of many most important works upon the sea, and set the summary forth in the light of personal acquaintance, in the hope that, without my book being definitely entitled a romance, it will be found genuinely romantic in the highest sense.

I have divided the work into sections, of which the first is the ocean as the health reservoir of the world. A brief consideration of this title will, I think, convince most readers that it would of itself suggest a most fascinating volume, and that the attempt to condense it within the limits of a couple of short chapters was somewhat hardy. Still, the attempt has been made, and I can only hope that it may lend itself to a stimulation of thought about the matter that will have a great effect. It is also entirely wonderful to note how the early navigators took to the sea as an open road, free from the terrors which then beset the

caravan, and braved all the dangers of the unknown and tempestuous deep so effectually that the new method of communication between the nations which they established never again fell into desuetude. Also, to note how, beginning with the commercial idea, sea-traffic degenerated into piracy; then into a means of oppression as a weapon of national warfare, or piracy on a larger, grander scale; then gradually through the ages retraced its career until it became the greatest medium of trade between the nations, freed from all fear of piratical onslaught because of the establishment of navies to protect it. It is no less interesting to note how, through a long series of events directly dependent upon one another, this little group of islands in the Northern seas, considered by the ancients to be right on the borders of, if not within, the regions of Cimmerian darkness, should gradually grow into the proud position of the first sea-power in all the world—not by any accident or inheritance, but by sheer driving force, both of hard fighting and keen trading.

It is a wonderfully inspiring theme for Britons, this growth of sea-power, and one that should hold a predominant place in the curricula of our schools of all classes, especially so now, when, as I have endeavoured to point out with all the emphasis at my command, we have come to rely entirely upon that sea-power for our national existence, our means of living, our daily bread. Not merely as a means of growing more wealthy, although it is the greatest factor in national prosperity, but as the one essential to our continuance as a nation. This cannot too strongly be insisted upon in these forgetful days, or

too early inculcated; indeed, it should not be a hard task to teach it to our boys, for the story is so interesting, so full of thrilling romantic interest, that even in the hands of the dullest teacher it could hardly be made dry. Under a proper handling of the subject, the grimiest little tramp steamer that ever lumbered across the Channel, deep laden with the roughest of cargoes, would become glorified, her sordid trade details would glow with a halo of romance that would fire the minds of even the most youthful hearers with a determination to uphold, at all hazards, that supremacy so laboriously gained. And for the older learners the story has one special advantage, in that it is entirely free from the deadening, hampering influence of party politics. It soars above the squabbles of party into the clear serenity of national interest, making all men agree that whatever divergent views they may have upon the means whereby our sea-supremacy shall be upheld, upheld it shall certainly be.

The first great aspect of the ocean dealt with is one that is of world-wide interest, because it affects the health of man generally. It is the part that the whole ocean-covered surface of the globe plays in the dissemination of vital force all over the world. This is no mere national question, it is universal, and with its benignant operations man has nothing whatever to do. Like the vitalizing sunlight, it is independent of good or evil, civilized or uncivilized behaviour on the part of man. Freed from his control in any sense, it is equally free from the consequences of his folly; it showers daily benefits upon him, whoever he is or wherever he may be, and he cannot

contract himself out of those benefits or barter away his birthright. He can, however, and he ought to, take the best advantage he can of these benefits, and not endeavour in his ignorance to shut out the blessings that ocean brings him. In this connection I have endeavoured to impress upon my readers the inestimable value of fresh air, which is solely supplied from the sea. Here, unfortunately, the resources of civilization have been so misused in numberless instances that the civilized man is really worse off than the savage. Heedless of the obvious fact that the principal factor in healthy life is the free access to human beings of the ozonized air of heaven, we see around us people of all classes actually endeavouring to shut out from their dwellings this life-giving element, blindly choosing to inhale the poisonous exhalations from each other's bodies and professing their dread of draught. Fortunately for the race, this disastrous practice is slowly dying out, although it is still a matter for keenest wonder to see country folk, after spending the day in the keen air of heaven, return to their homes or to public-houses, and there sit voluntarily asphyxiating themselves and undoing all the good that they have received during the day.

This, however, is a matter connected with ignorance of the commonest principles of health, and I have endeavoured to go a little farther and suggest an acquaintance with the source from which this inestimable benefit, this essential element of life, fresh air, emanates—the vast open spaces of the deep. There is yet another and not less important part which the ocean plays in its capacity as the source of health for

man, and that is as a vast deodorizer. It should be more generally known than it is, that the free air of heaven, becoming fatal to animal life after it has oxygenated the blood of countless millions, is then a beneficent food for plant life, the green leaves drawing their substance from it in combination with sunlight, and so proving Nature's intolerance of waste in any form. It is more widely known that the solid matters, the residual products of animal and vegetable life which are so offensive to the senses and so dangerous to health if unabsorbed, are in large measure dealt with by the kindly earth, and there are reconverted into nourishing food. But it is hardly realized at all that the ocean receives from the earth an incalculable quantity of these foul and effete residuals through the medium of the rivers, and deals with them rapidly and effectively in mysterious ways, of which, in the nature of things, we can know but little, though we may and should know that it does thus deal with them.

Of the agencies at work by which these mighty processes for the benefit of mankind are carried on, I have endeavoured to treat in the chapters on the winds and currents of the ocean, avoiding, as far as possible, scientific terminology and long drawn-out explanations. And when it is remembered how vast is the field covered by what is known as meteorology, or the science of weather, it will at once be seen how scanty and rapid has been the manner in which I have been compelled to treat this vast, important subject. The work of the winds, for instance, which is to convey to the land the revivifying exhalations from the ocean, to keep up the circulation of the

ærial ocean, at the bottom of which we live like fishes in the sea, to consider this exhaustively would be to write a series of volumes, not a couple of chapters. Yet I have hopes that a brief survey of what the wind is doing for us men all over the world, and a vindication of what is often considered its terrible effects, will be not only of interest but of use, leading readers to inquire still further into the workings of this wonderful, invisible friend of man. I have endeavoured to cover the whole field, trade winds, [illegible]age winds, and hurricanes of the various oceans, as well as to touch lightly upon the nature of the work they are doing and have done since the world began. In this connection I have had to bring in the clouds as co-workers with the winds in their beneficent work, more especially in what, if we consider for a moment, we shall admit to be, equally with the dissemination of fresh air, the most important function of the ocean. I allude to the providing of the fresh water of the globe.

Here we enter the very laboratory of Nature, open to all eyes, yet so profoundly mysterious in its workings that the keenest and most patient observers disagree as to the method in which the bitter waters of the sea are momentarily converted into sweet, drinkable fluid and poised high in air, contained within intangible reservoirs of cloud, ready to be conveyed by the waiting winds to wherever it is most needed. It will suffice for us to see the work going on, and to follow in spirit those amazing argosies of the air, blessing-laden, holding on their stately way across the firmament of heaven towards the parched and barren lands lying gaspingly awaiting their

coming. Here, also, there is no selfish consideration of our own wants, for we, living without the tropics, are seldom afflicted by drought, although, when such a state of things does arise, we are apt to realize what the almost periodical scarcity of rain must mean to the suffering millions of India. But there is, I submit, a grand and most highly romantic lesson to be learned in the contemplation of this ceaseless, silent, constant transi[illegible] of this prime necessity of life from the oce[illegible] to the land, which goes on independently of us and our trivial efforts, although in this case, as in nearly every other where Nature is working on our behalf, we may, if we will, aid her by storing up her products. Of course we cannot store the air, but in Egypt and in India we are now witnessing the amazing results of forethought, assisted by engineering science, in those lands once barren and now tremendously fertile, simply because the water which was once allowed to flow unhindered back to its source, the sea, is held up and distributed over the thirsty land in time of necessity.

I have also attempted to depict the work of the storm, of the hurricane, that awful demonstration of the power of the air, which is qualified to rank with the terror-striking earthquake and destructive volcanic eruption. Unquestionably the work of the hurricane and the ordinary gale is beneficent, although it cannot be gainsaid that in the pursuance of its high calling pigmy man is often called upon to suffer. And as we, in our short-sightedness, are often only able to see what affects our own immediate vicinity, we naturally dread these marvellous manifestations of the beneficent energies of Nature. Now, I am not attempting to run

a Quixotic tilt against human feeling; for who that has lost a dear one, or his livelihood, can be consoled by the reflection that it is for the benefit of the nation? I have only tried to show, as the Scripture does, that "all things work together for good," even the "stormy wind fulfilling His word," and I trust I shall be forgiven for introducing here these ancient words, which so aptly express the operations of Nature in obedience to that High directing-power which most of us have agreed to call God.

In the winds, of course, we have the circulation of the atmospheric ocean, which, like the circulation of the blood in the body, is ever active in health for good. Unlike the circulation of the blood in the body, however, the circulation of the atmosphere needs no drugs or physician's advice. It provides its own remedy, if there is any sluggishness or stagnation, by getting up a storm or even a hurricane, and the healthful equilibrium is at once restored. But as there is a circulation of the atmospheric ocean, so likewise is there a circulation of the watery ocean, although this is far less spasmodic, far more equable in its flow than that of the air. Here we have a subject curiously complex. It is international in its interest as regards the incidents of the tides, peculiarly local in its interests as regards the currents. And the main difficulty is to get the average man to discriminate between tide and current. I have strenuously endeavoured to show that difference in the chapters on currents and tides, and can only hope that I have in some measure succeeded. The steady ebb and flow of tides all over the world, dependent upon the movements of the moon and earth, are of the greatest importance to mankind

generally; but the steady, hardly-varying set of a body of water in the ocean in any given direction is fraught with incalculable consequences to the people inhabiting the land upon which that current impinges. Chief among all these oceanic rivers, both in size and as regards its influence upon the human race, is the Gulf Stream, without which Great Britain and, indeed, Northern Europe generally would be a desert. I have endeavoured to bring this fact prominently forward in the chapter on currents, for I feel strongly that we should know how it is that this little group of islands of ours is kept so habitable, so perennially green, while, in the same latitude, or at the same distance from the North Pole, in other parts of the earth the land for half the year, at any rate, is covered with a mask of ice. This wonderful natural method of preventing great vicissitudes of temperature is not the least of the great blessings we British folk owe to the ocean, but it is one which the bulk of us most thoughtlessly accept without ever dreaming of what would be our fate could any cosmic calamity divert the course of this mighty river of warm water, so that, instead of coming straight to us from the Gulf of Mexico, it should waste itself upon the already overheated coast of Africa, or, by the submergence of the isthmus of Panama, find its way into the Pacific, a possibility fraught with such terrible consequence to civilization that it hardly bears thinking of at all.

I have glanced briefly, too, at the working of the other well-known and reliable ocean currents and the work they do, which, though not comparable in its direct effect upon civilized humanity to that performed by the Gulf Stream, is still of tremendous,

hardly realizable, importance to the population of the world at large. Some space is also devoted to the consideration of the temporary currents caused by gales above or cosmic disturbances beneath the ocean, and having extraordinary influence upon the weather of the world, as well as assisting in the great and necessarily continuous work of maintaining the circulation of the vast body of water constituting at least three-fourths of the surface of our planet. This immense subject is so fascinating and so little understood, even by those who have studied it most deeply, that I have the greatest difficulty in confining myself to the prescribed bounds of two chapters, with the result I fear that my remarks will appear somewhat scrappy. I hope that this will be forgiven me when the object of my book is remembered.

Then there is the great question of the ocean as a food supply, the most fertile field known to mankind, requiring none of his labour to till it, none of his interference to make it produce perennially a store of animal food sufficient not only to feed the population of the world, but to supply the needs of its own innumerable inhabitants as well. Here we have the ideal chain of interdependence, a region where, without man's intervention, there is an abundance so overflowing that the mind reels to think of it. Indeed, it is beyond our calculations altogether, especially when we remember how close and intense is the application needed to make the earth yield her increase for the food of man, and how enormous is the space of dry land where nothing is or can be produced. In the ocean every inch is fruitful, abounding in life, all of which has its recognized position in the scheme of

things, so that we may trace, if we will, the pyramid of life from the minute globigerina to the majestic whale. Here, again, we have a subject that should be full of interest to us as Britons, remembering how favourably we are situated with regard to some of the most prolific fisheries of the world, and how utterly we are dependent upon outside sources for the great bulk of our food. It is also well for us to understand how, owing to the advance of science, we are now able to bring even so perishable an article as fish over many thousands of miles of sea as fresh as when it was first caught, although as yet we have not cared to develop this side of our food-supply to any extent. It is, I think, a consoling reflection that, however great the increase of population may be, there is to be found in the sea an ample supply for all its needs as regards animal food, a supply which only requires man's courage, hardihood, and skill to gather in, and wise methods of distribution to bring it within reach of all.

In the chapter dealing with the mysterious unknown and unknowable depths of the ocean, those immense profundities whose recesses we can never penetrate, I have been driven to the exercise of imagination based upon the scanty *facts* we have been able to collect from the results of the various expeditions which have been despatched for the study of oceanography, notably the memorable voyage of the *Challenger*. This, perhaps, is too esoteric a subject for general interest, and yet it has a fascination all its own, and its place in the sum of things we desire to know is a very high one. It is well, for instance, to know within a little the depths of ocean's abysses,

to realize the falsity of the poetical description of the "unplumbed . . . estranging sea." It is no longer unplumbed, and as for estranging, well, I prefer another poet's line: "the seas but join the nations they divide." Also, the knowledge that so far from the ocean below a certain depth being a place of absolute darkness and death, it is everywhere the home of living creatures adapted to conditions of life of which we can form but the faintest conception, under almost unimaginable pressure, in uniform cold, and in darkness only faintly illumined by phosphorescent gleams, emanating, not, as I read in a journal recently, from decaying things, for there are no decaying things in the sea, but from living illuminators glowing with self-produced and self-sustained light — a strange, mysterious world, from which man is for ever shut out, and about which his knowledge must necessarily be fragmentary and incomplete.

The terrible subject of naval warfare has been dealt with in the same sketchy manner under the heading of the ocean as a universal battle-field, a title which I feel is sufficiently justified by the fact that, with but few exceptions, all great powers that have anything in them of stability have found it necessary to maintain a navy. I have endeavoured to sketch the rise of naval warfare from the earliest times, pointing out how eagerly man, having discovered the utility of the sea as an ever-level road, traversed far more easily and with less danger than the land in those unquiet days, grasped at the possibility of making it a place of warfare also, rapine and bloodshed being the normal condition of his being; how the necessity for defending his merchandise, or the greed of the goods of others, also

suggested naval warfare on an ever-increasing scale, until it became the chosen and most effective means of preying upon their neighbours, of nations with a sea-coast; of its development from the hand-to-hand warfare, differing only from land fighting in that it took place on board of vessels, to the invention first of the ram, and then of gunpowder and cannon. Also, how, for many centuries, it was combined with sea-traffic, only occasionally being separated from it by the fitting out of some piratical expedition on a grand scale—excepting, of course, the raids of the terrible Vikings, which seem to have been conceived entirely for rapine and murder, and never for the purpose of peaceful trading, yet how from these bloody sea-wolves sprang the English, the greatest nation of peaceful traders that the world has ever seen. Then the gradual differentiation between merchant-man and sea-warrior, and the establishment of navies for the protection of commerce, and not for aggression, until finally there emerges the British Navy, the peace-keeper of the seas as far as unwarranted attacks are concerned. It is a thrilling story, however baldly told, and one which gives every Briton legitimate ground for patriotic pride, albeit the burden which it now imposes upon us of some *forty millions* sterling per annum is a gigantic one for any nation to bear. Unfortunately, experience teaches us that we need not look for any lightening of that burden, but rather an increase of it, for many years to come, the paramount necessity of protecting our commerce being absolutely vital.

Of the last chapter I need not speak, having in the opening part of this Introduction dwelt with all the

force at my command on what the ocean means to Great Britain, the subject which I have chosen for the concluding chapters of the book. Therefore I have now only to express the hope that, in spite of its many and obvious shortcomings, the present work may do something to awaken our interest in and foster our admiration of our glorious heritage of the sea.

FRANK T. BULLEN.

MELBOURN, CAMBS.
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OUR HERITAGE THE SEA

THE OCEAN AS THE WORLD'S RESERVOIR OF HEALTH

In olden days, or rather mediæval days, it was the fashion among pseudo-philosophers to speak of the sea as the *primum mobile*, the source of all human health and, in a measure, of prosperity. This conclusion was arrived at by no process of reasoning; like so many other dicta of those days, it was a shrewd guess, although stated with all the pomp and authority of a fundamental law which has been worked out and proved. Yet in this instance, at least, the old empirics spoke far more truly than they knew. The guesses of the Middle Ages at the higher uses of the vast water surface of the globe have become the facts of our day, and as science extends her boundaries it becomes more abundantly evident that what we have of health on land we owe to the "healing of the sea." In view of the fact that so many highly educated people among us have a horror of the sea, regarding it as a dread and dreary expanse of heaving billows, concealing terrors greater and dangers more immense than ever the ancients dreamed of, it may be well for a while to draw attention to the entirely

beneficent aspect of the ocean's work for man. This is not in any way altered in value by the fact of the ocean bearing the aspect which has been dealt with elsewhere. But it is an aspect of the ocean's work that is almost altogether lost sight of even to-day, unless we consider the great rush to the seashore of our island populations as in some measure a recognition thereof.

That recognition is, however, of the very faintest and most unreasonable kind because almost entirely individualistic. The man who can afford to get away from his stuffy workshop or office down to the sea-coast cannot but feel the benefit of the ozone-laden air, whether he bathes his stiffened limbs in the brine or not; but the cases are rare indeed where such an one on returning to his place of work, realizes that the benefits conferred upon him and his kind by the sea do not cease when they have retreated far inland. Even those who in populous city pent are never able to get away to the sea or the open country are indebted to the sea for the modicum of health that they enjoy, an all-pervading benefit that, like the rain, falls upon the just and unjust alike, and cannot be cornered and sold by even the most American of Trusts with all their power and greed.

No benefit that the sons of men enjoy receives less recognition than this. The fresh air, the sunshine, rain after drought—all these occasionally receive a meed of gratitude from even the most ungrateful; but the sea, which modifies and energizes them all, is rarely thought about. And this, while not to be wondered at in the case of continental people, who may hardly ever have heard of the sea even, is almost

inexplicable in an island folk like our own, who can never get more than a hundred miles away from the shores laved by the ministering sea.

These, however, are but general statements, and I hope now to come to some particulars of the ocean's wonderful duties, which shall familiarize some, at least, with its work for them, and cause them to remember their mercies in this direction if they have never done so before. Now, it is both seemly and proper to begin with our own land, this wonderful little group of islands set in a silver sea, which, from the circumstance of its geographical position and the constant ministrations of the ocean, has had so mighty an influence upon the well-being of the whole world. A word of deprecatory comment is here necessary. In dealing with the currents and the winds of the ocean, some little reference to their influence upon the health and wealth of nations has been impossible to avoid, and consequently they may appear to give ground for a charge of repetition. If so, I would ask you to remember, first, that in order to drive the subject-matter of a certain great theme into most people's heads it is absolutely necessary to repeat, and secondly, that in dealing with so inextricably interwoven a subject as the ocean in all its bearings upon the life of the dry land, some little repetition is entirely unavoidable, in proof of which I would quote the works of all the great oceanographers, such as Reclus, Maury, Murray, and others perhaps less renowned but quite as painstaking and accurate, with none of whom do I even pretend to compete. In connection with this same question of repetition, let me relate an illuminating experience of my own. I was staying with some dear

friends of the highest intellectual calibre (I dare not particularize) in the suburbs of a northern city, and on a Sunday morning my hostess invited me to come with the family to their church to hear their minister, whom she described as a perfect marvel of didactic eloquence. I went, and for the first ten minutes of the sermon was very pleased. But for the remaining forty minutes I was intensely bored, because it was abundantly evident that all the preacher had to say he had said in the first ten minutes, after that all was repetition *ad nauseam*. Upon leaving the church I was pressed for my opinion of the preacher, and gave it honestly. "Ah," said my hostess; "but, you see, most of us need that plain repetition in order to fix the facts firmly in our minds, otherwise an average shallow memory, such as mine, is unable to retain even a modicum of the discourse." Which saying, although to my mind savouring of rather sensitive modesty, set me thinking, and left me with the conclusion that the lady was not far from the truth of the matter.

So much by way of preliminary, now to the subject. What does the sea do for us Britons in the matter of health? Well, in the first place, situated as these islands are on the eastern verge of the North Atlantic Ocean, we must receive the full force of the westerly winds, the prevalent westerly movement of the whole atmospheric mass over full three thousand miles of open ocean. There is nothing to shield us from its impact, no intervening land to filter away, so to speak, some of its benefits from us. Throughout the greater portion of the year this mild, moist wind flows steadily towards us from the west, whatever asperity it may

have originally possessed upon leaving the American Continent being softened and ameliorated by its passage over the wide ocean, free from all malarial exhalations, pure with a purity that only salt can give, and fresh with a freshness only obtainable on a level surface constantly in motion and free from the myriad foulnesses and fœtors of the stagnant land. But the wind does not work alone. It is aided by the vast ocean current of the Gulf Stream, whose warm waters steadily pursue their way unbiassed by tidal waves, unaffected by cross-blowing occasional gales, and sending upward continually into the bosom of the attendant winds its fresh moisture, freed from saline particles, but impregnated with that mysterious electrical component ozone which is, without question, an important constituent of life itself.

Yet, lest the atmosphere over these islands should become too humid, and our people lose their energy by reason of constantly basking in a moist, equable climate, enervating and unhealthful, there are divers divagations from the direct eastward flow of the general wind currents. Down from the icy regions of the Arctic circle, edged by the bitter cold of the eternal ice, comes the north wind and north-easter, and our comfort-loving folk complain of the sudden change, not knowing, or even caring to know, how entirely good for them is the change; for while we may know what is good for us, it seldom follows that we seek that good, and when it is thrust upon us, we are all too apt to murmur and mutter that if we had been allowed to order things celestial they would have been much more endurable. Possibly; yet who is there so mad that he would willingly give the

charge of the weather even for one week to the most gifted of the sons of men? Sometimes, it is true, a sudden influx of icebergs, released from their Arctic prison, will invade the North Atlantic in early summer and refrigerate the mild west wind so severely that it descends upon our shores scarcely less frigid than the blast from its opposite quarter, edged with bitterness from the icy Russian steppes. Undoubtedly in such a case individuals will suffer. The patient agriculturist may see in a night all his hopes of a good crop brought to naught, and difficult indeed will it be to convince him of the general benefit conferred by this bitter blast when he is smarting under the knowledge of his own particular ruin. Weaklings, too—young and old—who, lured from protection by the geniality of the weather, have ventured farther than their wont, are stricken and die, to the sorrow of those to whom they were dear, but to the undoubted benefit of the race. When the wise man said that it was the hard grey climate that made hard grey Englishmen, he did not incur the obloquy of saying that the Englishmen who were neither hard nor grey, and could not become so, must be eliminated by the inexorable forces of Nature; in other words, they must die early and die often. No, he left that to be inferred, and unfortunately *it is* too often forgotten with many other things that should be remembered.

The foregoing remarks, however, only apply to the often broken British summer, dependent as it is entirely upon the steadiness of the west winds and the Gulf Stream. Many hard and unjust things have been said about it, mostly untrue, and generally by people

who have had no opportunity of judging its merits. When all is said for and against, it remains true that the British summer, like its winter, makes for health because of its freedom from extremes. The scourge of consumption is almost entirely due to the unwisdom of the people, and not at all to the rigour of the climate. Even to-day, when hygienic knowledge is growing from more to more, how frequently do we find people—in railway carriages, for instance—excluding the pure, health-giving air, and voluntarily poisoning themselves with the miasmatic exhalations of each other! How many times have I pleaded for one window to be opened just a little way, only to be told that a draught was dangerous, deadly, and other skittles of the same kind! These are the people who spend an ocean passage wrapped up as if they were in the Arctic, and never give the lovely health-bringing wind a chance to blow on them.

It is the principal function of the ocean to give space for the collection by the winds of ozone, of oxygen, and hydrogen, all destroyers of disease germs, all inimical to the waste products of humanity in their original form; and it is the prime function of the winds, when thus loaded with disease-resisting and disease-destroying germs in the place where alone they may be produced in all-sufficient quantities, to bear them swiftly whither they are most needed. What the chemical process is, by means of which these disinfecting or deodorizing gases are generated in the wide expanse of ocean, need not here be considered any more than the method by which the wind is raised which conveys them to their destination. It is surely sufficient for our present purposes to admit with great

joy the fact that in the immense alembic of the ocean, these health-breeding gases are generated, and that the wind is ready to convey them to the land.

Now, to bring this matter once for all within everybody's comprehension. Suppose that an immense number of fairly well educated people could be asked the question, "What is the first elementary need of man?" they would undoubtedly answer, "Fresh air." Few, indeed, are the folk to-day who do not know that lack of fresh air kills as swiftly as a knife stab or a bullet in a vital part. Of course it is strange that, in the face of this universal knowledge, so many of us should be content with stale air—tainted air—when we might have it fresh; but still more strange to my idea is the fact that so many people are entirely ignorant of what fresh air is or where it comes from. Does the asthmatic, rising in the agony of suffocation, and flinging open his bedroom window to the night wind, ever realize to what he owes his relief and whence it comes? I am safe in saying not once in ten thousand times. And yet it is so simple: the source of all fresh air is the sea. The verdant meadows, the desert wastes, the mountain chains, the inland lakes—all these are pensioners upon the sea's bounty; all these take and do not give, save that the green leaves absorb a poisonous gas and use it for the plants' upbuilding, but they do not produce an equivalent blessing as does the sea. The sea alone of all the earth's expanse is actually engaged in gathering from all its elemental resources matter for the service of man. *It is a field* untilled that yields ever in richest profusion the most sacred necessities of everyday life to the world's inhabitants, and looks for nothing in return. It is,

indeed, the *summum bonum* of natural forces, the chief almoner of the Almighty.

But it may be objected that, important as the digression is, it is still a digression, for we were considering the effect of the winds upon Great Britain. Well, while I admit that to some extent, I must needs point out that not only does Britain receive incalculable benefit from the ministrations of the winds reaching her from the Atlantic, but that the continent of Europe is also the recipient of these benefactions in no stinted measure. Surely it is worth remembering that Paris, with its most delightful climate, is parallel to St. John's, Newfoundland, or nearly so, and that when the latter is masked in thick-ribbed ice, Parisians are lolling contentedly in the open air on the boulevards. Again, leaving Britain aside for the moment, think of Denmark and North Germany being parallel with Labrador, that great coast whose very name brings a shudder, where the few inhabitants do not live—they endure martyrdom, and look upon those things of life which we regard as hardly to be endured as their chief blessings. Yes, Europe is indeed blessed by her position with regard to the prevalent winds over the North Atlantic Ocean, and if anything were needed to call our attention to the fact, it is abundantly supplied by the occasional incidence of the east wind which comes to us, not health-laden or mollified by a wide expanse of ocean over which it must travel to reach us, but filled with cruel energy inimical to life and comfort by its passage over vast breadths of land. Even though arising in the frozen ocean, it was not entirely harsh and hateful when it first struck the land, but in its passage over Russia, the last traces of

benevolence were desiccated out of it until it arrives as a scourge before which even the strongest must cringe. What it would be did not the North Sea intervene, let those unhappy dwellers upon Russian steppes or German frontiers to Russia tell. Thank God, we in this country know nothing personally of their sufferings, as is most evident from the fuss we make over a few days' frost or an evanescent snowstorm. Our standards of comfort and good weather are very high.

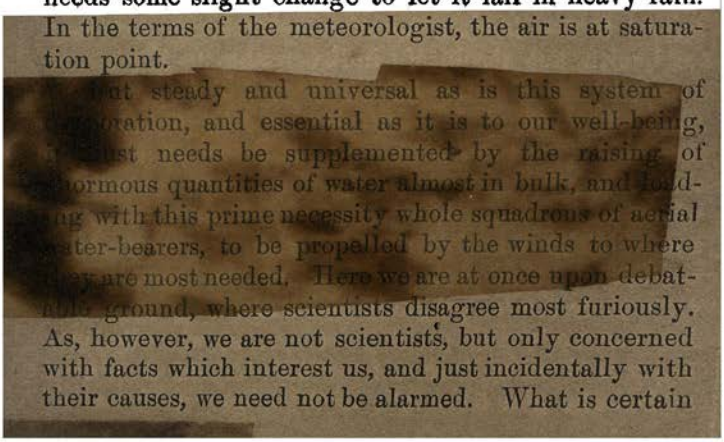
Still, bitter as is the blast of the east wind over the wild steppes, it bears health. We can scarcely blame those hardly used millions for their ignorance of or inattention to the most elementary rules of cleanliness or sanitation. Behold, the universal cleanser, the deodorizer comes, the wind from the clean sea, and behind its triumphant path disease germs drop dead, their career of infernal activity at an end. "Why, then," those comfortless ones might argue did they know or care aught about the matter, "should we deprive ourselves of the simulacrum of comfort we now and then obtain, by attempts at keeping ourselves clean, which we regard as a waste of energy?" Only it seems such a pity that men should thwart actively the efforts of the sun and the fresh wind from the sea to keep them alive by barring out as far as they are able these two mighty agents of health.

Now, on the borders of the great Mediterranean sea, which is, after all, but an exaggerated lake of salt water, the sea does not get fair play for its beneficent labours. In the first place, there are no regular wind currents to convey the ozone shoreward, and, in the next, the circulation of the waters is largely carried on

beneath the surface, keeping the water sweet indeed, but not sufficient to accumulate deodorizing energy for the benefit of the land. It is a striking proof, if any were needed, of the maleficent influence of the land that the countries surrounding the Mediterranean, with but few exceptions, should be so unhealthy, and that a peculiarly virulent type of malaria should have received the name of Malta fever. Think of it, malaria generated in a lonely rocky islet without swamps or dank undergrowth or jungle, only set in an almost tideless sea that is powerless to aerate its superheated and densely populated streets. And in saying this I am not at all forgetful of the charms of the Riviera. I only point out what is an undeniable fact, that where the free motions of wind and current over and in the sea are hindered from any cause whatever, the adjacent land must suffer because of the lack of those ministrations, which are peculiarly the province of the sea.

Before going any farther south, however, we must consider the other great function of the ocean with regard to the land, a function not merely necessary for health, but absolutely indispensable to life at all, I mean the providing of the earth with fresh water. Here a host of minor influences must be remembered that make for the health and prosperity of a nation, according as the happy mean in the continual supply of fresh water is reached. But the first thing to remember is that all the fresh water in the world is distilled from the sea. In this day of universal education, there are few people in civilized countries who do not know of the simple chemical process whereby fresh water is obtained from salt water, but there are almost as few who give a thought to the mighty fact that all

over the ocean's wide surface the sun is daily engaged in raising from the bitter brine of the sea an incalculable supply of sweet fresh water, which those swift messengers the winds are everlastingly hurrying with to the dry land. This raising of fresh water from the sea is accomplished in two ways, by evaporation and by the mysterious and marvellous phenomena known as waterspouts. The first process is familiar to us all, the way in which a vessel of water in a dry room will gradually diminish in quantity, the dry air like a sponge sucking up the water and holding it in infinitesmal particles, ready to let them fall upon a sudden alteration of atmospheric conditions. We all are familiar, too, with the phenomenon of what we call a damp day, when the air is like a vapour bath, and everything around becomes clammy and moist. There may be no clouds laden with rain, yet everything is wet, and we cannot help feeling that the whole atmosphere is almost as dense as water itself, and only needs some slight change to let it fall in heavy rain. In the terms of the meteorologist, the air is at saturation point.



But steady and universal as is this system of evaporation, and essential as it is to our well-being, it must needs be supplemented by the raising of enormous quantities of water almost in bulk, and loading with this prime necessity whole squadrons of aerial water-bearers, to be propelled by the winds to where they are most needed. Here we are at once upon debatable ground, where scientists disagree most furiously. As, however, we are not scientists, but only concerned with facts which interest us, and just incidentally with their causes, we need not be alarmed. What is certain

about the matter is that under certain atmospheric conditions, and generally within the tropics, the clouds send down long tentacles to the sea-surface, which we have agreed to term waterspouts. One of these at its period of maximum activity bears no bad resemblance to the trunk of an elephant engaged in drawing up from the surface of a stream a supply of water. But the process is entirely different. In the first place, the elephant's trunk is of solid material, just a living hose sucking up mechanically water unchanged in its character. The waterspout is composed of vapour, transparent, and in constant whirling motion, and the water, which may easily be seen rushing up at a terrific rate, leaves the sea-surface salt and arrives in the sky fresh. How this is brought about no one knows, but that it is accomplished is a fact impossible to dispute. So the waiting cloud receives its burden of fresh water, and is borne upon the wings of the wind landward, where in due time it meets with obstructing mountain peaks, or is rent asunder by discharges of electricity, and deposits its burden of blessing upon the thirsty soil, into which it penetrates to form springs and rivers, which, after irrigating the land and assuaging the thirst of the animal and vegetable kingdoms, finds its way back in due time to the bosom of the ocean once more. Here it is purged of the impurities it has contracted during its course upon earth, and, after completing its purgation, is once more started on its career of beneficence.

Of the manner in which this aerial distribution of water is carried on, of the formation of raindrops, snow-flakes, and hail, this is no place to speak; it is a subject demanding a volume to itself. We are only

now concerned with the fact that our water to drink and to feed the plants on which we live comes from the sea, and is brought to us by the agency of the winds. Of course the quantity of moisture received by any particular portion of the earth's service varies greatly, according to its geographical position and its physical contour, some parts of the earth receiving water greatly in excess of their needs, and others suffering continuous shortage, these variations having an immense effect upon the importance of the country and the scheme of the world's affairs.

Here, again, we in Britain have been most highly favoured. We are given to much grumbling about our uncertain weather conditions, and owing to our complicated interests, agricultural and manufacturing, it is next to impossible to arrange that all shall be satisfied at the same time, yet it is undoubtedly the fact that to her climatic conditions caused by, as well as allied to, her geographical position Britain owes her greatness in the world. When we go further south along the African shore, we find that excessive rainfall and steamy heat have produced dense forests, the home of malaria and kindred diseases, because the blessed health-giving wind cannot penetrate their dark recesses and sweep away these poisonous exhalations. There man's energy is sapped by the enervating conditions of the climate, and so, although the teeming earth produces wealth in overwhelming abundance, only a tiny part of it can be utilized, owing to the dreadful tax imposed upon humanity by the climate.

Moreover, this over-rich belt along the coast arrests the wind and the rain, leaving the vast interior desert, a waterless, treeless waste, whereon the fierce sun,

unveiled by cloud, beats with pitiless force, raising the temperature to heights almost unbearable by even the wonderfully adaptable human frame, and rarefying the air so much that a certain effect of indraught is created as far away as the open ocean, the cooler and heavier air rushing in to fill the vacancy created by the raising of the superheated atmosphere, but being, as before noted, arrested on its way with its cargoes of wetness by the steaming forests of the coasts. South of the equator a better state of things obtains. The sea breezes find their way farther into the interior, and although there are still to be found immense desert spaces as dead as the Sahara, there are mighty rivers and immense lakes of fresh water fed by the constant influx of rain-bearing clouds from the ocean. Here the land is highly diversified. There are climates meet for all races, fertile land at many elevations, and it may be that South Africa will one day be the home of a teeming civilized population, as far removed from the horrible conditions under which their aboriginal predecessors lived as it is possible to conceive. But we must not dispose of South Africa in this summary fashion, remembering that the immense water privileges and splendid health conditions it enjoys are due to the work of the Indian Ocean winds, and not to those of the South Atlantic, down which we are slowly wandering.

But for the certain fact that every one knows, or ought to know, that in Nature there is no waste, we might be tempted to ask what benefit does the circulatory system of the winds of the Southern Ocean afford to mankind? With the exception of our colonies in Australia and New Zealand, with a comparatively

small portion of the great South American continent, there is no land in their way, no inhabited country for them to exercise their splendid recuperative and cleansing forces upon. And the question might perhaps be justified if the globe were divisible into self-contained sections, and was not one entity. The work of the world-encircling winds of the Southern Seas has its due effect upon all the rest of the globe, which, after all, is but a small sphere in the cosmic scheme, and to imagine it sweeping eternally around the globe, chasing its own tail, as it were, and accomplishing nothing, is to take a petty and parochial view of such mighty activities. Rest assured that, although we may not be able to assess it in terms of arithmetic, the work of the brave west winds of the Southern Ocean are of the highest importance to the health and well-being of the globe as a whole, and when meteorology, or the science of weather, has come to its own, we shall know how and why. For the present we must take on trust the fact that this immense wind system, the greatest on our globe, is ever working for the benefit of all mankind.

But let us now take a long step backward to the north-western shores of the Atlantic, and see what effect the oceanic winds have upon the mighty continent of America. Truly there is here a vast problem awaiting us, for, as we have already seen, the winds of the North Atlantic, northward of the tropics, are from and not to the American continent. So that, speaking generally, it is fairly safe to say that they do not exercise much influence upon its health, except in one important particular, which is that by blowing from the continent they create an indraught from the westward;

they draw, as it were, the immense wind system of the Pacific over the continent, and thereby keep it aerated. But with that at present we have no concern, we have only to remember the work of the Atlantic for Northern America. Farther south the North-East Trades, ploughing across the wide expanse of the Atlantic, strike the extreme south of the United States, and recurve along its shores in company with the great current of the Gulf Stream. But in the nature of things these winds can have but little effect upon the climate of the Southern States, which indeed lie in a sort of eddy, and are consequently insufficiently aerated, having immense areas of swampy land in which malaria lurks, deadly and miasmatic, only a short distance from the coast. And yet Florida, Georgia, and Alabama contain some of the choicest spots of the New World areas, which are near enough to the coast to get the edge of the recurving Atlantic winds and receive the benefits which they bring.

Coming farther south we find the Antilles, lying like a range of fortresses clear in the fairway of the Trade Wind and current, and, according to our theory of the aerating qualities of the oceanic winds, they should be among the chief sanitoria of the globe. Yet we must sadly admit that this has by no means been the case in actual experience. Let us for a moment inquire why *this* can be, stating the pros and cons in a purely impartial spirit, holding no brief for the West Indies at all. The chain of the Antilles, a series of peaks of submerged mountains, rising from terrific depths of ocean, and only showing a trivial proportion of their bulk above the ocean-surface, extend from about ten degrees north of the equator to the limit of

the Tropic of Cancer. The full strength of the North East Trade impinges upon the eastern coast of each island, and, rising, sweeps over it into the Gulf beyond. But these islands are nearly all mountainous, and their peaks arrest some of the immense rain-bearing clouds borne by the winds, so that their contents are discharged into the humid valleys, and dense, dank vegetation rises from the fertile soil. Therefore, although the ground is not swampy, the fecund growth makes aeration impossible; and while upon the higher levels, where the healthful wind has free sway, an almost perfect climate is enjoyed, in the valleys there is disease, principally malaria, which exacts a tremendous price from those who venture to live there, in order to garner the wealth which lavish Nature spreads broadcast; for it cannot be too strongly pointed out that the food of vegetation is the poison of man.

Science, however, has come to man's aid, and shown how, by a little attention to certain laws, notably a comparatively recent discovery, that tropical diseases are nearly always disseminated by insects, such as the deadly mosquito, these once dreaded regions may be lived in with almost as complete an immunity from disease as the wind-swept uplands of more favoured northern climes, while the highlands of these favoured islands afford an almost perfect refuge for the weaklings who are unable to withstand the searching bitter blasts of higher latitudes. Whether in the near future the sense of the community will be favourable to the idea which now prevails of preserving the unfit and penalizing the useful for the support of the useless and dangerous is another matter.

I, for one, look forward to the time when the West

Indies, as these beautiful islands are erroneously called, will be the ideal winter resort for those who can afford to leave the inclement Northern regions during the sun's sojourn south of the line. Already the enterprise of great steamship companies is bringing this beautiful region well within the reach of people of quite moderate means, and it is pleasant to know that this energetic prosecution of legitimate business is rewarding its promoters in substantial fashion.

Our consideration of the climatic conditions of the countries bounding the great Middle Sea of the West, the Gulf of Mexico, must be exceedingly brief. First, because the aeration of these countries from the East is very slight, the ocean winds having been arrested in their benevolent career by the great chain of the Antilles; and, secondly, because the owners of most of these countries do, by their gross neglect of all the ordinary rules of health, deprive themselves of most of the benefits the ocean winds lavish upon them. As an instance of this, I would quote the case of the beautiful city of San José, Costa Rica, which is situated in an ideal position at an altitude of several thousand feet above the sea, between two oceans, and close to both, with the result that the climate is about as perfect as can be found in the whole world, although it is only about six hundred miles north of the equatorial line. When I was there a short time ago, I ventured to remark to my host that, in such a lovely position, both climatically and picturesquely, I should expect that the death-rate was abnormally low. He sadly shook his head, and informed me that, so far from that being the case, it was the exact contrary, the death-rate being dreadfully high by reason of the prevalence of *typhoid*.

There is no need to comment upon this, it bears its own commentary, and in view of the fact that the city has expended about £250,000 upon a reduced copy of the Paris Opera House, its own condemnation also. Yet Costa Rica is about the most enlightened and progressive of all the South American Republics, with the sole exception of Mexico.

The great republic of Brazil and the colonies of Guiana receive but little assistance from the winds of the Atlantic, from their unfavourable situation on the eastern side of the broadest part of the South American continent. Richest in natural productions of all the countries of the world, and favoured beyond most tropical regions by the nearness of the great centres of civilization, the vast wealth of these immense regions has been barely touched as yet. The character of the rulers has something to do with this in the case of Brazil, but not so much after all, because the same causes which make that mighty land so inordinately rich prevent humanity from taking full advantage of those riches. The healing winds from the Pacific cannot penetrate those gigantic forests fostered by heat and fed by the most copious rainfall imaginable. Here is a river system, fed from the Andes, which has not its peer in the world; minor tributaries here attain a length and volume equal to almost any of the great rivers of the ancient (so-called) world. But when that day has arrived, which seems now to be within measurable distance, that the teeming millions of the more densely inhabited parts of the earth begin to feel the pinch of hunger, owing to the *inability* of their own country to produce sufficient food for their needs, eager eyes will turn to this continent with its

incalculable riches, and, despite all its present unfitness for human habitation, it will then be exploited to the full.

Even now the splendid territories south of it, lying as they do in more temperate climes, and although as profusely watered, by reason of the narrowing down of the great continent, more perfectly aerated, are receiving yearly an increasing number of the eager hordes of Europe, principally Italians. These magnificent republics of Argentina and Uruguay are growing in wealth and population at an amazing rate, and effete as the Latin race appears to be in Europe, it is here renewing its mighty youth. Given that *sine qua non* of prosperity, good, honest, stable government, no long time can elapse before these swiftly-growing republics will demand and take their place among the great Powers of the world.

THE OCEAN AS THE WORLD'S RESERVOIR OF HEALTH (*Continued*)

NOWHERE, perhaps, in the whole world is there to be seen so pointed an instance of what the land is bound to become when deprived of the best influences of the ocean as in Asia. In the broadest part of the great African continent, it is true, we have a striking instance of what the land becomes when the sea breezes cease to blow over it. The great desert of Sahara, uninhabitable, inhospitable, has, no doubt, its part to play in the great economy of Nature in that the fierce heat of the sun, striking upon the unwatered land, rarefies the air as in a vast oven, and causes an indraught from the moist heavier air of the ocean to redress the equilibrium, and thus assists the beneficent circulation of the aerial currents. But long ere those helpful breezes have reached the interior so sorely in need of them, they have been deprived of their moisture and their coolness, and consequently this great area is, and will ever remain, barren—unless, indeed, the splendid dreams of some great schemers should ever be realized, and by the cutting of a huge canal, or series of canals, the ocean should be conducted into this vast waste portion of the earth's surface.

What stupendous changes in the climate of the

whole world would be brought about by the addition of so many thousands of square miles of water to this arid region can only faintly be conjectured, but one thing is certain, and that is that the vast alteration could not fail to be beneficial. The immediate probability is that the great continent of Africa would become available for colonization by men from temperate regions, and that the shores of that great inland sea, another Mediterranean, would be fertile beyond belief, while the fierce heat and excessive dryness of Northern Africa would at once be exchanged for a livable temperature and an agreeable humidity entirely favourable to vegetation and all kinds of animal life. It requires, indeed, no great stretch of the imagination, assuming that what we are told of the favourable levels of the Sahara for its flooding by the Atlantic be true, to picture this vast inland sea bordered by thriving cities and richly cultivated land, while fleets of steamers would be busily engaged in bearing its teeming produce from port to port. At present, however, this is only a dream of the civil engineer, whose dreams, however, have a knack of crystallizing into rich reality. The mere idea, though, goes to prove how entirely dependent the land is upon the sea for all that makes life worth living or indeed possible.

But to return to Asia. Whatever the future may hold in store for Africa in the way of benefits by the ocean when aided by man's enterprise, Asia can never hope for any share in them. Those vast arid steppes, mountain ranges, and barren valleys are, by their geographical position, entirely removed from any possibility of becoming habitable by aid of the sea.

It is true that intrepid explorers, wandering life in hand over and through these desolate fastnesses, do occasionally come across traces of an extinct civilization, filling the mind with wonder as to what manner of men they were who thus fought with the sternest conditions of Nature, and existed amid such terribly deterrent surroundings. And the conclusion must inevitably be arrived at, that climatic conditions there must for some unknown reason or another have been better in those far-off, long-forgotten days. But the life must, in any case, have been barely tolerable, compelling the hardy hordes who raised those long forgotten cities to migrate ever westward to the fairer and more favoured lands nearer the sea. Even in what we are taught to believe was the cradle of the human race, Armenia, Northern Arabia, and even some parts of Persia, we now find so terrible a condition of things climatically that we cannot conceal our wonder at human beings managing to exist there at all.

As we go farther East, matters grow worse, and we see that only nomadic life is possible, a condition of affairs precluding civilization and keeping the scattered tribes inevitably down to a level of barbarism. The record of explorers like Sven Hedin, who have managed to travel about those truly terrible regions, fill us with amazement at man's endurance, as well as wistful wonder as to what could have been the conditions under which the large aggregations of human beings whose traces he found could have lived. In short, we are driven to the conclusions, first, that in the days of those ancient civilizations which we are compelled to believe did once exist in Middle Asia, the climatic

conditions must have been entirely different and more congenial to human life than they are now; and, secondly, that nothing short of a cataclysm restoring those conditions could again make those regions not merely habitable, but capable of civilization again. And this makes Russia's eager conquest of those barren wastes the more pathetic in our eyes, and the question more insistent, Why should she seek to acquire these vast territories which can never be of any material value to her?

It must not, however, be forgotten that this desert condition of Middle Asia is due entirely to its remoteness from the sea. Of all lands with which we are acquainted, not actually within the frigid zones, Asiatic Russia suffers most for its inability to participate in the blessings brought by the sea, and so it serves as the great object-lesson in the value of the sea to mankind. That magic loadstone which has ere now caused some of the most inhospitable places of the earth to become, for a time at least, the home of a teeming population—the discovery of gold—can hardly effect the same change in those terrible regions, so remote are they from civilization, so tremendous are the difficulties of transport, and so severe are the vicissitudes of climate.

But when we leave those arid, desolate regions and come south, where the great open spaces of the sea lave the shores of the huge peninsula of Hindostan and the coasts of Burmah and Siam, we see at once a totally different order of things obtaining, especially in India, where the influence of the ocean has made this vast country one of the most fertile and densely populated in the world. Its condition is in striking

contrast to that obtaining upon the eastern and northern shores of the Arabian Sea, with its great inlets of the Red Sea and Persian Gulf. There the sea, being unaided by shoreward winds, has had little influence upon the land, and in consequence Somaliland, the Eastern Sudan, Arabia, and Baluchistan are sparsely populated, and their inhabitant races inured to the utmost privations that an arid country, serrated with huge mountains and subject to the fiercest rays of the sun, can inflict upon them. True, there are occasionally to be found delightful oases, that by some happy combination of climatic circumstances are beautiful and fertile beyond description, as in parts of Persia, and what we have been led to believe was the first home of mankind. But there, again, judging from the mighty ruins that have been discovered by explorers in the midst of awful deserts, peopled only by a few wretched nomads, we are also driven to the belief that vast changes of climate must have occurred to reduce these regions to their present desolate condition. Nothing else surely could have depopulated them and made them so barren as they now undoubtedly are.

India, however, in spite of its many centuries of devastating warfare, of the utmost efforts of man to render of no avail the bountiful gifts of Nature, still remains a land of teeming populations, a soil that is annually receiving from the sea the prime necessities of life—for both animal and vegetable—is probably wealthier now than in any former part of its history. Even the habits of the people, who with a dull passive ignorance resist all the efforts of Western science to teach them the elementary laws of health, are

powerless to prevent the healing of the sea from saving them from that extinction they court. Remembering, as we must, the havoc wrought among them by self-invited pestilence, by the failure of the life-giving monsoon sometimes to arrive in due time, to the strange apathy in the presence of disaster so characteristic of these mild millions, we cannot refrain from wonder at the marvellously recuperative power of Nature in keeping the population of India at its present density; and this, too, while giving full credit to our own countrymen for their labours in saving the Indian in spite of himself, not grudging life or labour in the herculean efforts to rescue these fatalistic folk from the apparently incurable habit of lying down effortless to die. And if it be a good deed to save human life, to give yourself up freely to the task of rescuing thousands who do not care for rescue, who have no will to live or care for the morrow,—if there be any heroism in these self-sacrificing labours, then surely the records of the Indian Civil Service are truly a roll of honour as bright as can be found in the history of mankind. A certain class of politician, solely for the basest of party purposes, has seen fit from the comfortable seclusion of English homes to malign these men, to belittle their work, to rant about their rewards; but I hold it a shameful thing to do. As if any wages could pay for such service as we have seen rendered in plague and famine times in India!

But this is somewhat beside the question. These heroic men would be the first to admit that but for the aid which Nature has afforded them, principally by the inrush of the clean rain-laden gales from the sea, their labours would have been brought to naught, and India

would long ago have become even as the valley of the Euphrates or the Peninsula of Arabia. And year by year the scientific labours of enthusiastic civil engineers, in storing up the wealth of water which falls from the skies during the south-west monsoon against the long period of drought during the rest of the year, conjoined to the wonderful and elaborate system of afforestation which is ever being carefully carried out, is aiding the beneficent work of Nature, and adding to India's population and wealth. Of course it is another and much more difficult question to decide whether this humane removal of Nature's inexorable checks to the too rapid growth of the people is working for good or evil eventually; but with that, fortunately, we have here nothing to do.

Crossing the great Bay of Bengal to Burmah and Siam, we come again upon a continent immensely enriched by the sea. But at present the very abundance of Nature's provision of water conjoined to the warm climate renders the country unhealthy by reason of the density of its vegetation, which prevents the free circulation of the health-laden winds from the sea. But even here the hand of the European is gradually making itself felt in the opening up of this magnificent land, rendering it more habitable and healthy, and preparing it to be the abode of an immensely greater population than it has ever known. But it is at a heavy cost in life to the white regenerators, whose northern birth-places have ill prepared them for the struggle with this dank climate, so full of heat and moisture that it is like living in a perpetual Turkish bath. Still, there is here much wealth to be gained, and, although giant strides have been made within the last

half-century, the surface of the country's wealth has only just been scratched, as it were.

Coming farther south, we have the great islands on the west of the East Indian archipelago, Sumatra and Java, which, in spite of their intensely tropical position, are yet so favourably situated with regard to the sea that it is marvellous how backward they are still in point of wealth exploited for the service of man. Perhaps the fact of their being in possession of so slow-moving and phlegmatic a people as the Dutch has not a little to do with this. Indeed, it is almost a misnomer to speak of their being possessed by Holland, since it is well known that a very great portion of the islands has never yet been brought under the sway of the nominal lords of the country, and desultory war is ever being waged between the aboriginal owners of the soil and their Western overlords. As far as health is concerned, however, these islands will favourably compare with any other part of the world, their tropical heat being so finely tempered by the sweet sea breezes, and their highly diversified contour admitting of the enjoyment of all kinds of climates, even up to the very cold.

Farther south, on the same side of the Indian Ocean, we come to the western shore of the great Australian island continent, where there is room for a great nation to assert itself. Australia, however, can hardly be considered piecemeal, it must be taken as a whole. It is an amazing country, whose career is indeed hardly begun. Its climatic conditions are of the very best, and here the white race can live and breed without any of the disabilities attendant upon them in India, Burmah, Malaysia and such places. It

is true that, in the interior of this gigantic island, most of the land, remote as it is from the sea, is desert, arid, and worthless as the Sahara; but the mighty margin reached by the sweet influences of the various oceans is vast enough and rich enough to maintain a population in wealth and prosperity at least a hundred times as large as it at present carries. It is warm, even hot, but it is healthy, and every form of wealth, both mineral and vegetable, abounds, and is easily obtainable by man. Yet it must be admitted that, compared with the amazing development of the United States, and even Canada, its progress is extremely slow. Were it germane to our subject, it would be easy to find many reasons, not excuses, for this; but they would be far from satisfactory, and would, indeed, be rather mortifying to our pride.

What, however, we can say with emphasis is that Australia is geographically, and consequently climatically, one of the most highly favoured countries in the whole world. It possesses all the qualifications needed by a land for the making of a mighty nation. It is hot, no doubt, but by no means unbearably so, and it is so far from being too humid that one of its principal drawbacks to prosperity is drought occasionally. But it may be said that in the whole of its cultivable and habitable area, it is fitted to be the home of the white race, and there can be little doubt that in the future it will be the seat of a dense population, perhaps even greater than that of its giant sister British North America, which is now, in spite of its many climatic disabilities, making such mighty strides in prosperity. South of Australia, again, is the lovely island of Tasmania, which might fitly be called the

world's Eden, so exquisite is the climate and so wonderfully rich the soil. Its position is ideal, as is its configuration, and yet its population, all whites, and all passionately fond of their country, is less than that of one of our overcrowded provincial cities. Its one handicap is its distance from the world's great markets, and it must be admitted that this is indeed a heavy item on the adverse side of the account. It, again, is a standing proof of how great a blessing to a land is its being set within the embrace of the life, health, and wealth-giving ocean.

Farther east and south, set in lonely state amid the turbulent waste of the world-encircling Southern Ocean, lies the Britain of the south, New Zealand. I only know Tasmania by report, although I feel certain that in my somewhat glowing description of that lovely island I have done it less than justice. But New Zealand I know well, from the Three Kings to the Snares, and I feel constrained to say that, much as I love this dear mother-land of ours, of all other lands beneath the sun that I would choose to live in New Zealand is the first. In many ways it is to be preferred before our England. Beautiful as is the climate of Cornwall, Devon, Dorset, and South Wales, due, as I have pointed out, to the benevolence of the sea, their sweetness cannot compare with the superlative qualities of the north island of New Zealand, which I shall always maintain possesses the most perfect climate in the world. We rave about Italy, and, doubtless, the soft Italian airs are charming, but she is subject to the sirocco and the mistral, venomous blasts which find no counterpart in those Southern islands of the blest. The New Zealander, indeed, has

within his own boundaries a perfect range of all that is best in the way of climates. If he desires the hardness of, say, Yorkshire in autumn or even winter, Southland and Stewart Island can give him what he calls for; and if, shivering there, he longs for soft skies and genial never-scorching warmth, he may reach them in a few hours. I know of no land beneath the sun more delightful to dwell in than the northern part of the north island of New Zealand, and although, alas! I have no connexion with it in any way, I need no inducement to sing its praises.

But I feel that now I am getting too far away from the ocean at present under consideration, and my only excuse must be that Australia and New Zealand always seem to claim attention as a whole, although over a thousand miles of boisterous sea divides them. Retrace we our steps to the torrid shores of Eastern Equatorial Africa, where we shall find that, in spite of its geographical drawbacks in point of position, its proximity to the sea and its tremendous mountain ranges combine to make it far more endurable as a human habitation than the corresponding portion of South America. In fact, judging from the reports of those intrepid explorers who have gaily risked life and limb in opening up this rich land, there is here to be found a splendid opening for colonization from Europe, when once the initial difficulties of clearing the land have been overcome, and the main pastime of the natives—war and its concomitant, slavery—has been sternly put down. Here are immense lakes of fresh water, like those in North America, and having nowhere else any counterpart, except in the barren wastes of Asiatic Russia, where

the vast areas of fresh water known as the Caspian Sea and Lakes Orel, Balkash, and Baikal remain in lonely grandeur unused, and apparently, until Russia is regenerated, unusable. A very different future obviously awaits the great lakes of Eastern Africa, and it requires no vivid exercise of the imagination to picture them bearing an immense commerce, distributing the amazing wealth of their fecund shores among the busy population. This prospect, which is daily in process of becoming realized, is made possible only by the fact that here in Southern and Equatorial Africa we have no vast mountain chain intercepting the lower wind strata from the ocean on either side, and in consequence these health- and wealth-bearing ministers can and do range in comparative freedom over the vast African land, making it habitable and comparatively healthful for Europeans. And this it is which makes the British possessions in South Africa so immensely valuable, apart altogether from their amazing mineral wealth—the fact that they are eminently fitted to be the home, not merely the temporary abiding-place, of Europeans, who may thus by their continuity of domicile build up a mighty nation, if only they set about it in a right way.

Strangely enough, however, this does not apply to that magnificent African island Madagascar, now belonging to the French, and, unhappily for them, sharing the evil reputation of all their other colonial possessions. Its position is an almost ideal one, enjoying as it does the impact of the ocean breezes on all its shores. It is long and narrow, comparatively, and lying almost north and south, it invites the complete aeration of the ocean winds. But, except upon the

tablelands of the interior, it is a terribly unhealthy land, its dense jungles breeding fever of a peculiar malignant kind. Were it in possession of a colonizing race, there can be no doubt that in no very long period its amazing mineral and vegetable wealth would be exploited, and its exports, at any rate, assume an important place in the world's trading returns. But as it is, poor France has nothing to show for her mighty acquisition in territory but costly expenditure in money and more precious life, nor does that heavy account show any sign of diminution as the years roll on. Here, again, is an example of how Nature, when unaided by the efforts of man, can make even the most favourably situated land uninhabitable. Perhaps the day will come when this splendid island may be brought to its proper place among the nations, and allowed to show how large a welcome it can give to the increasing millions of mankind.

Here, perhaps, it may not be amiss to digress for a moment in order to call attention to the rubbish that is so frequently talked about the overcrowding of the globe. Though not perhaps strictly germane to our subject, it is sufficiently cognate to excuse a brief allusion, while its importance merits far more attention than it usually receives. Taking our own dear land first, there can hardly be a doubt that, under a really scientific and careful system of agriculture, we might not only be independent of foreign food, but that our land might easily support at least double its present population. When you travel about this little island of ours, and see the enormous cultivable areas of land given up to weeds, and casually growing trees, except, perhaps, for the grazing of a few sheep, note the

immense (proportionately) acreage devoted to sport (so called) which might under cultivation feed thousands where it now only affords a few fleeting days' pleasure to dozens, you are irresistibly led to inquire, "Where is the overcrowding that I hear of?" and you are led to the inevitable conclusion that the territorial magnate, drawing his revenues from the manipulations of finance, who selfishly keeps from the people the land wherefrom they might be fed, and compels them to buy from the foreigner, is an enemy to his species.

When, however, we pass to other lands, with their many millions of fertile acres still untouched by the hand of man, a very little reflection will suffice to show us how far from being over-populated is this globe of ours. I have already spoken of the mighty area of Australia, with its population only about two-thirds of crowded London, of the vast untilled spaces of South Africa, and of the almost limitless fields of South America, and I feel struck with absolute amazement at the careless dictum of the ill-informed croakers who speak of the over-population of the earth. This, however, as I have said, is purely by the way.

Turn we now to the mighty Pacific Ocean, whose enormous area is so sparsely studded by islands, tiny spots of land, just punctuating that wonderful sea as do the stars the sky. These beautiful portions of earth enjoy, as might be expected from their positions, an almost perfect climate; yet the majority of them, owing to the nature of their soil, are not extremely fertile, their vegetable productions being of a limited order, and not nearly so valuable to man as are those

of less favourably situated lands. But from the point of view of health, these islands are as nearly perfect as can be, and such diseases as the inhabitants suffer from are of a nature easily preventable, and due almost entirely to ignorance and natural sloth. When, however, we turn to the mainland, we see quite a different order of things prevailing. The Pacific seaboard of North America, when once the frigid zone has been passed, is exceptionally favoured by Nature to be the home of a multitudinous population. It is humid, as might be expected, since, as everywhere else on the eastern seaboard of an ocean without the tropics, the prevailing winds blow right on shore, bringing with them not only health, but that vivifying moisture so necessary to vegetable growth.

But here at once we are met by the great peculiarity of America, both North and South—the mighty chain of mountains which rear their giant heads skywards, and arrest the rain-laden clouds as they pass inland, making them discharge their contents and assume a totally different character to what they bore when they first struck the land. As, for instance, in the northern lands of Manitoba and Assiniboia, where, by some wonderful alchemy of Nature, the bitter winds from the almost Arctic Seas are, during their passage over the mountains, bereft of their harsh character, and descend upon the immense plains, even in winter, with a mildness that is almost marvellous; especially by contrast with the plains of Dakota and Montana, far to the southward of them, whose weather is very much more severe. It is this beneficence of climate which has led of late years to the enormous influx of United States citizens into

Canada, and their eager taking up of the wonderful wheat-growing lands of this splendid domain under the British flag.

Yet it would, indeed, be hard to find a land more perfectly fitted for the occupation of the white race than the Washington and Oregon territories which border the Pacific. Their gigantic rivers abound with salmon, their vast land areas are perfectly suited to the growth of cereals when the mighty forests of pine have been felled and sold, never to grow again; while as for health, except for their undoubted humidity, it would be difficult to find a better country to live in, except the next state south, the marvellous land of California. Here, indeed, are to be found in a superlative degree all the climatic conditions of which I wrote so glowingly when considering South Africa. It would be impossible to find a more perfect climate than that of California, except perhaps that of Tasmania, although some parts of Australia and South Africa run it very closely. And all these wonderful lands owe their delights to the sea, whose healthful breezes are ever flowing over them, and bringing in a never-ending stream those aerial blessings which they so richly enjoy and seemingly prize so lightly.

Coming still farther south we reach Mexico, which is, I believe, destined to become one of the great Powers of the world, if only its present wise governmental rule may be maintained; for when all has been said that can be about the bounties of Nature, it remains true that much depends upon the character of the inhabitants whether a land, whatever its natural advantages, becomes prosperous or remains in a state of nature, like a neglected garden, where the weeds

choke and prevent the growth of useful vegetation. And Mexico is certainly one of the most highly favoured countries that the world can show. Every form of mineral and agricultural wealth that can be named is there in abundance, only needing the care of man to yield up their treasures; and this, it is pleasant to add, they are at present receiving, with the result that Mexico is advancing by mighty strides to her destined place among the nations.

When, however, we come farther south, we find a very different condition of things obtaining. Favoured to an almost incredible degree by Nature, the Central American lands have long been cursed by the ineptitude of their people, apparently unable to value how goodly a heritage they have, or how highly favoured they are. They behave, without a thought for to-morrow, like unruly children let loose in a lovely garden wherein grows spontaneously all that the heart of man can desire; and the most pitiful sight of all to see is the manner in which, by careless, indolent ignorance, they frustrate the efforts of Nature to keep the land sweet and healthful. In these wonderful countries Nature only needs man's co-operation to create a paradise. She does not get it. Instead, man makes of the land a sink, takes not the most elementary precautions against the defilement that an aggregation of lazy humanity must make wherever they are, and in consequence these beautiful republics, instead of being ideal dwelling-places, are hotbeds of disease. And as if that were not enough to prevent any progress, the chief recreation of these extraordinary people is bloodshed in periodical revolutions, the land being always in a state of anarchy.

Farther south, again, we come to the great republics of Peru and Chili, which, in spite of their national tendencies towards revolution and war with one another, are certainly far in advance of their northern *confrères*. Here, however, though from the point of view of health their situation leaves nothing to be desired, it must be remembered that they are practically confined to exploiting the mineral wealth of their narrow strips of territory along the feet of the mighty Andes, the backbone of America. By an irony of fate than which I can conceive nothing more romantic, these two practically non-agricultural republics furnish the principal means of agriculture to the Old World in the shape of guano from the bird-haunted rocks of the Chincha Islands, and the enormous deposits of nitrate of soda, discovered by science to contain the prime necessities of plant life, and for this purpose eagerly purchased in Europe. Rich as the two republics are in the more precious minerals, it is quite safe to say that but for their deposits of these far humbler materials for agriculture, they would long ago have ceased to be considered at all as worthy of a place among the nations of the world. Now, however, their other mineral resources, of which the rocky fastnesses of these republics hold great store, are being exploited to their great profit.

South of these territories again, we come to a land which is practically barren, and hardly worthy of being called habitable. It is very sparsely populated, and, scourged as it is by the wild western gales, against which it rears its tremendous barrier of mountains, it offers no inducements to the colonizing powers, although, doubtless, if, owing to mineral discoveries,

any attempt upon it was made by European Powers, the Spanish-speaking republic would soon set up a Monroe doctrine of their own. Of course these lands are healthy, they could not be otherwise, situated as they are in the midst of the vast Southern Ocean, and freely exposed to all its health-giving powers.

Now we must make a swoop northward again to the coast of Siberia, which has a climate analogous to that of Labrador, its relative geographical position being the same. It is a bitterly barren land, and its mighty areas are almost destitute of inhabitants. But a little farther south we come to the island empire of Japan, which, although less favourably situated than our own cluster of islands as regards climate, bears no bad resemblance to them. Owing to the fact that they have no great ocean current laving their shores and bringing from tropical climes a steady influx of warmth, their vicissitudes of temperature are great, as great as those of Eastern Canada, and for the same reasons. Yet, being set as they are in the midst of the sea, and being, like New Zealand, a series of long narrow islands, no part of which is any great distance from the coast, the Japanese territories are wonderfully healthy, and breed, as we know, an amazingly virile race, with whom the world has found that it must reckon very carefully. The temptation to enlarge upon the climatic conditions of Japan are great, but must sternly be repressed because of dwindling space. It must suffice to say that nowhere in the whole world is agriculture carried to so high a point of perfection as here, for nowhere are so painstaking and persevering a people to be found. Their great drawbacks are the prevalence of

earthquakes and volcanic outbreaks, which, however, this wonderful people accept with that calm philosophy which is one of their strongest features. These cosmic disturbances, however, have nothing to do with climate, and the reasons why they are prevalent in one part of the world more than another is one of the mysteries of our earth which remains to be solved.

South and east of Japan, the vast empire of China claims attention, as being, like its inscrutable people, an anomaly. It alone among nations really owes little to the sea. It is so vast that it possesses all climates within its borders, yet, as has often been noted, its seasonal changes are more regular than can be found anywhere. And it cannot be called unhealthy, since, with a total disregard of all sanitary precautions and an utter defiance of what Westerners understand of the laws of health, its people are the most prolific in the world. But China is the land of paradox, the exception among the nations that must be taken to prove the rule that the health of the land depends upon the healing of the sea. But of the vast outlying islands, such as Formosa and the Philippines, another set of conditions must be noted. Well within the tropics, they are also most favoured with ocean winds, which blow through and through them, and make them teem with vegetable wealth which has hardly been scratched as yet. They cannot be called healthy for the same reasons noted in the consideration of the other East Indian islands and Madagascar, but one day, under the fostering care of a wiser race than now holds them, they will doubtless yield an amazing increase in their contributions to the wealth of the world, and their marvellous advantages in the matter

of oceanic position will be made full use of, to the enormous benefit of those who then possess them.

South, again, come Australia and New Zealand, those mighty appanages of the British Empire, with all their splendid advantages of geographical position; but as they have already been dealt with, we may here omit further mention of them, and conclude our lightning survey of the ocean as a reservoir of health for the whole world.

THE WINDS OF THE OCEAN

To the ordinary citizen, wind is a factor of life of which he takes scarcely any cognizance, except it cause him inconvenience or positive suffering, as when in summer the high winds blow dust-laden from the direction in which he desires to go, or in winter, when the bitter blasts of easterly wind seem to penetrate to his very marrow, scorning to take his clothing into account, and making him feel, if he be at all weakly, as if it was in very truth the lethal breath of the death-angel. As far as our islands are concerned, this is about the sum of the landsman's consideration of the wind, unless he be a cyclist or a motorist. Of course, I do not speak of sea-farers of any sort as ordinary citizens; they are a class by themselves. Even shepherds and farmers only regard the wind from the standpoint of its snow and rain-bearing capabilities; and therefore it remains, as I have said, true that in these islands wind, as a factor in his life, is of very little personal interest to the ordinary citizen. This, however, by no means holds good in other lands. It would be quite an easy task to compile a respectable book upon the various winds of the earth, and the intense interest they have for its varied inhabitants, from their effects upon human life, from the sirocco and khamseen winds of the desert to the chinook winds in the far west of British North

America. To dwellers in those countries or on their borders, the wind is an all-absorbing consideration, meaning, as it does, all the difference between life and death in many cases, and in numberless others making life worth living, or the reverse.

But it is not with the winds of the land and their countless local peculiarities and variations that we have to deal. The winds of the ocean, or rather the watery world—that is to say, two-thirds of the surface of the globe—claim our attention as being one of the greatest factors, if not the prime factor, in disseminating the bounties of the sea over the land. And, first of all, it is necessary to remember that mobile and volatile as the winds of heaven are, and elusive as they have hitherto proved themselves to be to the earnest and painstaking prognosticators of weather, they, like everything else connected with the physical characteristics of our earth, are ruled by certain great laws of which as yet we have only been permitted a glimpse. The aerial ocean has its currents, its tides, its eddies, as the watery one has, but with far more variations, as might have been expected, considering the difference between the two elements, air and water. Many of these currents are fairly regular in direction and average force; others are irregular, according to season; others are permanently irregular, but in their average direction and force are stable enough to leave their effects, say, on the trees of the islands over which they blow, which show by the direction in which they bend how they have been coerced during the time of their growth. These are of the main currents of air. Between them there are eddies, whirlpools of air, so to speak, and stagnant or nearly stagnant places where apparently

the atmosphere may rest undisturbed. But over the main air currents lie possibilities of tremendous aerial disturbances, as if Nature resented the even, equable flow of the wind for any great length of time, and must needs give it a tremendous shaking up just to stimulate the circulation. And these catastrophic events are known, according to their locality, as hurricanes, cyclones or typhoons, or, in minor cases, tornadoes or whirlwinds. But whatever their local appellation, or wherever they take place, the principle of them remains the same, viz. a more or less whirling motion against the apparent passage of the sun, or in the opposite direction to the movements of the hands of a clock in the northern hemisphere, and with them in the southern, while the whole whirling area of wind is borne onward in a given direction, much as the wheel revolves upon its axis, yet goes forward withal.

But of these violent disturbances more presently, and particularly in their turn. The place of honour in the consideration of ocean winds must, I think, always be given to the Trade Winds of the Atlantic, not only for their important bearing upon the trade of the world in the days that have gone, but their wonderful influence upon the health of the countries that dominate the rest of the world. Let it be remembered that there are in the Atlantic Ocean two great currents of air in motion, or wind, one north of the equator, between 30° N., and that imaginary central line, called the North-East Trade Winds, and the other occupying a similar position south of the equator, known as the South-East Trades. Their names signify the direction from which they blow continually, with a little variation, it is true, according to the time of the

year, but sufficiently steady—especially as it is wind we are considering—to be called a permanent current of air. Now, it will certainly be asked, Why do these great air currents act thus—why, indeed, are they in being at all?

Well, without pretending to be scientific, but at the same time keeping closely to fact as far as it has been ascertained, the reason of the Trade Wind is this. Within the tropics the sun's rays pour down fervently and heat the air, rarefy it, in fact, so that it rises higher and higher above the sea, leaving room for the colder, heavier air from the poles to rush in and fill up the partially vacated space. Now, if the globe did not revolve upon its axis, the direction of these inrushing currents of air would be from due north and south towards the equator. But the girth of the revolving globe increases from pole to equator; the tropical surface—often, therefore, like the outside of a wheel—is moving from west to east faster than the incoming air from nearer the poles, which, so to say, gets left behind and is deflected in the direction of east to west. So that northward of the equator the north wind acquires an easterly trend, and to the southward of the equator takes the same bias. Hence these two main streams of moving air or wind travel more or less steadily in a north-east or south-easterly direction, and from their dependency and steadiness they have received the names they bear of the North-East and South-East Trades. Of course, there are other factors which enter into the production of these two mighty air currents, such as the changeable influence of the heat over the land, configuration of the land, etc. But these are the main causes, and, since this is in no sense a

treatise on meteorology, the statement of them will suffice.

Now, the North-East Trade, acting upon the surface of the ocean perpetually, has also an enormous influence upon the current, is, indeed, the main cause of the great equatorial current which ever sets from east to west; but that will be considered later. What is now to be thought of is the way in which this wonderfully steady wind has affected the trade of the world. Without it Columbus would certainly never have discovered America, and the amazing development of the trade of the Old World with the new would have been delayed for centuries, if not prevented altogether. Those who have read descriptions of the epoch-making voyage of the great Genoese will remember how terrified the sailors became when the wind blew steadily day after day in the same direction, favourable to the course they wished to steer; for they naturally felt how impossible it would be for them ever to return against such a steadfast wind as that. They could not possibly imagine any counter current of air that would favour their return, and as they sailed farther and farther from their native shore, they doubtless felt that they had bidden it an eternal farewell. It would ill become us in these latter days, when the self-sacrificing labours of a host of patient observers have familiarized us with the conditions obtaining over the whole of the great waste of the deep, to smile at the fears of these pioneers of Atlantic navigation. With a little effort of the imagination we can place ourselves by their sides, and, entering into their terrors, sympathize with them to the full.

But once the means of return had been discovered,

once it was found that northward of a certain parallel the steady north-east wind did not exist, but instead there was a region where variable winds, variable both in force and in direction, but prevalently west, or directly favourable to return, the great trade route was established, the whole vast commerce of the western continent was opened up, and a steady chain of vessels began to pass between the two worlds, as they were then thought to be, binding them into one. Still, it was only a beginning, and much remained to be done before the wonderful wind system of the Atlantic ever began to be understood. Besides, it was a leisurely age — hurried, perhaps, in comparison with that of the pyramid builders, but, compared with ours, how sedate and stately in its progress from the twilight of discovery to the glaring sunlight of full knowledge. For instance, how great must have been the consternation of the bold Spanish mariner who first discovered that below a certain parallel of latitude the steady north-east wind, upon which he had been taught to rely, failed, disappeared, and was succeeded by calms and light airs blowing from every quarter of the compass, heavy blinding rains and waterspouts. Slow as the progress of those old clumsy craft was at the best of times and under the most favourable conditions, it now seemed as if escape from this bewildering environment of stagnation must be impossible. The sufferers could not know that they had entered the indeterminate region between the two trades, the belt of equatorial calms, known so well to later generations of seamen as the "doldrums," a place of dread, yet to be passed by the constant exercise of watchful seamanship and the taking advantage of every slant,

every favouring air, until the adjacent steady trade was reached.

This intervening space, whence most of the world's supply of fresh water is derived by the marvellous condensing machinery of the heavens, varies according to the position of the sun north or south of the line, as the popular phrase goes. That is to say, when the sun at his meridian appears to be south of the equator, the belt of calms and variable winds is narrowest on the northern side of the imaginary line, and *vice versâ*. As, however, the South Atlantic is of much greater area than the North, and consequently the celestial influences we have noticed have so much greater play, it follows that the South-East Trade Winds are much more extended in their scope, as well as much steadier in their force and direction, than the North-East Trades, so much so that it is by no means uncommon to find a steady south-east trade carrying a vessel well north of the equator, even as far as ten degrees north latitude; and I have known only one day intervene between losing the south-east wind which we had carried from within sight of Table Mountain, Cape of Good Hope, and catching the North-East Trade Wind, which sent us flying with our yards braced almost sharp up well into the temperate zone. But I admit that such an experience is unusual.

We must, however, turn to the South-East Trade as experienced by the early navigators. They found as they neared the land that it became less steady, while, preserving its general direction, it was gusty and variable; but that, of course, troubled them little once they were in sight of land. In those days of

imperfect astonomical knowledge it was the great thing to get hold of the land and sweep along it; the sailor having plenty of time, delays were not considered as comparable with the sense of security which the knowledge of the proximity of *terra firma* conferred. Our later wisdom has shown us that modifications of these great air currents are always to be found according to the relative position of the land and the season of the year, meaning the relative position of the sun above, and consequently the incidence of his heat and its rarefaction of the air, and so we have borrowed a Persian word and corrupted it to "monsoon," meaning "season." This word we have applied to those modified Trade Winds near the land which exhibit many marked variations from their parent atmospheric stream.

To go into these seasonal variations of the prevalent winds of the Trades would be to impart perplexity to what I wish to render simple, namely, the great steady flow of air from the north-east; and yet I cannot help pointing out again that, in considering the great movements of the air and sea currents, steadiness must always be held a relative term, and what we are bound to term complexity in view of our many observations doubtless resolves itself in the great scheme of the universe into one harmonious whole, obeying one universal law. What that law is belongs to quite another discussion, and, being quite unable to make any pronouncement upon it, I say nothing. Now, keeping still to the North Atlantic, as being the home of latter-day navigation, we come to the great west winds, the prevalent wind, which since the early days of North Atlantic navigation has been made use

of to bring ships home to Europe. After long research I find that the origin of this wonderful wind is as mysterious as most of the great natural phenomena, if not more so. It cuts right across, if we may so put it, the southern flow of air which determines the Trades, yet everywhere all round the world, where it has ample room and verge enough outside the tropics, the west wind blows preponderantly, and the greater the ocean space the steadier the brave west wind prevails. Yet here, let me say, that within my own small experience I have always found it in the Southern hemisphere with a tendency to veer, that is against the movements of the hands of a clock, until it came to the south-east, when it would falter, suddenly shift to north-east, and then begin to work round slowly to west again in the same direction.

This, however, is straying far from the North Atlantic and its extra-tropical winds. The nearest approach to an explanation of why these winds should blow so persistently from west or west-south-west is the converse of the easterly touch in the Trades. The hot tropical air descending as it cools to the depleted temperate zone, whence the Trades were drawn, is moving faster from west to east than the earth's surface when it descends. As in a circulating boiler, equilibrium is established, a steady current of air in one direction is balanced by an opposite wind close to it, relatively speaking. If this be the case, it is certainly a cause for wonder that the counter trade is so much less steady in direction and certain in its flow than the Trade itself. But perhaps what it lacks in steadiness of course it makes up for in the violence with which it often blows when on its proper course,

or from west to south-west. Northerly and southerly winds, even with easting in them, blow hard too, but not for long; and although the easterly wind will sometimes persist in a wonderful way, it is but seldom that it reaches the force of a gale. The westerlies, however, may not only be depended upon for their frequency, but for their force, and it is no uncommon thing for a sailing ship to run very nearly across the Atlantic before a heavy westerly gale, which seems as if it could not blow itself out. Still, the west winds have their zone, and north of it there is little or no continuity in the direction of the wind; it may blow in any direction, and be as violent in one direction as another. This unsteadiness in the farther north may be accounted for by the interference of land, which has, of course, a great influence upon the wind blowing near the surface of the earth, while the upper currents obey other influences with which we are as yet but imperfectly acquainted.

This prevailing wind, before the advent of steam, had a very great effect upon navigation from the time of its discovery, making the return passage from the North American continent always a fairly rapid and certain one, as compared with the slow and difficult outward journey, necessitating a great *détour* to escape the full force of the opposite gales. Even now, in these days of high-powered steamships, although they do not go out of their way to avoid the westerlies, they are often greatly hindered by them, for it needs no argument to show how tremendous is the force with which a great steamship is thrust against by a gale dead in her teeth. Still, the wonderful regularity with which these vessels make their passages both ways

shows conclusively that they have succeeded in bidding defiance to the winds, and also that they must very often find what a seaman calls "slants," or alterations in the prevailing wind. More, it is often the case that a gale extending over an enormous area, and travelling at the rate of, say, one hundred miles a day, will be entered by a sailing ship going in its direction, and as she is travelling with it she will feel its full force for several days, with but slight alteration in its direction. But a full-powered steamship going against that gale would soon pass across its area and emerge into the better if unsettled weather in the rear of that gale. I feel that this statement needs explanation, and yet I do not want here to go into the intricacies of meteorology. May I, then, briefly say that all gales outside the tropics blow in a circular direction, as hinted at in the mention of huricanes a few pages back. This, however, "verges on the scientific," which is out of the question in such a book as this. Yet unless the law of storms is, however perfunctorily taken into account, it does not seem possible to understand anything about the great movements of extra-tropical winds.

Hitherto I have endeavoured to confine myself to the movements of the winds over the ocean without taking into account the influence that the land has upon them when they come near it. That, however, is very great, but fortunately can be understood fairly well by the average landsman, who knows from every-day experience how different the movement of wind is in a hilly country to its regularity of force and direction in a level one. Or, to make the comparison still more homely, how many variations of wind we

find in the streets of a town compared with what they are in the fields, or even in a park which is not too well wooded. It is very difficult, indeed, in a town to know what the direction of wind is or estimate its force because of the way in which it is deflected, flung into eddies, suddenly increased or as suddenly calmed, according to the angle on which it strikes obstructions. All these variations are reproduced on a much larger scale by the winds of the sea when they come in contact with the land, according to the configuration of the latter. But what is most wonderful is the way in which a great gale system approaching with great force and rapidity the coast of Ireland, let us say, from the westward, will suddenly be dissipated, calmed down, and become harmless when it might have been expected to do enormous damage. On the other hand, an ordinary breeze circulating quite pleasantly and sluggishly in a similar direction will, upon meeting with the coast, suddenly develop into a terrible gale, devastating the coast and carrying destruction far inland.

This is hard to understand, but it is akin to the way in which, when sailing along a deeply indented coast, the wind will suddenly rush seaward upon a ship lying in a calm as if some mighty giant had just awakened and hurled an unseen thunderbolt at her. It behoves the mariner to use the utmost caution when sailing near such lands, lest his ship should suddenly lose her masts, for these blasts come raging down without the slightest warning. Truly the wind is a force of Nature that is most mysterious in all its ways, not only because of its invisibility, but because of the strangeness of its behaviour. One particular instance

comes to mind which, while easily explainable, is exceedingly strange to observe. On some of our vertical cliffs the herbage grows close to the edge, and sheep graze all along the down, keeping, as a rule, at a good distance from the danger of falling over. But when a gale is blowing right dead on shore the sheep will be found, not, as might be expected, far inland taking shelter, but close to the cliff edge. Their instinct teaches them that they will find shelter in an almost calm strip, for the stormy blast, striking the cliff face rises, straight upwards, and acts as a barrier against the wind that would otherwise come horizontally over the top close to the ground. If the wind were visible, it would seem to form a sort of covered way, varying in width from the edge to some distance inland, and of a height proportioned to the force of the gale. In the same way a fence composed of flat palings set at a distance from each other, equal to their width, will be found to form a perfect protection against wind blowing at right angles to it, a cushion of rebounding air from each paling preventing any wind from getting through the interspaces.

So as what the wind does on a small scale it will do on the largest scale imaginable, it will be found that in the narrower waters of inland seas and lakes it will be vain to look for steady breezes, and sudden squalls as well as shortlived but furious tempests will certainly occur from every quarter of the compass. The Mediterranean Sea, although of great extent, is peculiarly liable to these storms, and the early mariners who in the infancy of navigation sailed that classic sea, undoubtedly received a first-class education in

handling their frail craft, every kind of weather being encountered there, and that at the very shortest notice. But, then, they were all more or less fatalists, and very apt, when the weather became too bad or the wind was contrary, to furl the big sail and let her drive, feeling that, having done all they could, their fate was in the hands of the gods, and nothing that they could do, would do, would make any difference. It will be remembered that Luke records in his account of Paul's voyage that "we strake sail and so were driven."

But it is time to get into the open ocean once more. The South Atlantic for the greater part of its area is under the benign sway of the South-East Trades, which, owing to their much greater scope and freedom from hindrances, are steadier in direction and more equable in force by far than their counterpart in the North Atlantic, the North-East Trades. So steady and persistent are these southern winds, that they are often found to continue well to the northward of the equator, and to reduce that variable space so much dreaded by all sailing-ship mariners which lies between the margins of the two Trade Winds to quite a narrow strip. While, however, this latter state of affairs is entirely acceptable to the seafarer who is dependent upon his sails and anxious to get his ship along, it is doubtful whether it is not evil for the world at large, for here more than anywhere else is the great reservoir of the prime necessity of life, rain. Here may daily be seen the lading of clouds from the broad bosom of the ocean, not by the almost invisible and slow process of evaporation which goes on all day and every day, but by the agency of the mysterious waterspout. This

is the great waterspout field, and one may vainly speculate as to how many thousands of tons of pure fresh water may be seen in one day drawn and transmitted from the broad bitter bosom of the ocean to be carried away far from the sea and replenish the springs which feed the rivers of the world and make it habitable. Of all the uses of the sea to mankind, and they are many, I suppose there can be none greater than this, and yet it is an aspect of ocean that very few people give a second thought to; they seem to take for granted the existence of some subterranean machinery for the production of fresh water and the filling of the ever-flowing rivers. It is so easy to forget how during a dry season, which will probably coincide with the more than usually close approximation of the Trade Winds to each other, the great rivers will show an almost alarming diminution of their waters, small rivers will run dry altogether, and wells will cease to supply water.

Nowhere in all the oceans is there to be found so pleasant and placid a region as that which lies between Africa and America south of the line. Within that vast space, bounded on the south by a fairly well-defined line drawn from east to west in about 25 degrees south, storms are unknown. The steady gentle circulation of the atmosphere here apparently needs no such violent stirrings up as are fairly common in other oceans, and at all seasons of the year it may be safely navigated in a small boat. It is a striking proof of the non-maritime character of the inhabitants of the West Coast of South Africa, that none of them in past ages found their way to the American continent, so easy and smooth is the passage; at any rate, no

trace of them has ever been found in America until the beginning of the accursed slave trade between the two countries, and that did not commence until after the Renaissance or in comparatively modern times. But with the advent of steam this beautiful expanse of ocean began to be less accounted of. It was the paradise of the sailor, who often boasted that he could sail for thousands of miles without touching a brace except to freshen the nip, *i.e.* to take a pull so that the ropes should not be too long bent at the one spot.

It is an ocean, too, singularly free from obstructions in the shape of islands. Trinidad, and the rocks of Martin Vaz, Fernando Noronha, Ascension, St. Helena: these few peaks of huge submerged mountains rear their heads above its quiet waters mostly at vast distances from one another, but are quite unable to do anything by way of disturbing the majestic flow of the Trades. And in its centre there is a space large enough to contain a mighty continent, where now no man ever comes with the exception, perhaps, of a solitary New Bedford whaler, one of the half-dozen or so still pursuing this historic trade in the ocean solitudes. It is, too, the most evenly deep ocean. Down its centre runs the South Atlantic ridge which shoals to 7000 feet, but has an average depth of 17,000 feet. The islands before mentioned spring almost perpendicularly from such stupendous depths as these.

When, however, we leave the fairly well-marked southern limit of the Trade Wind, we enter at once upon a region of unrest, and what the sailor calls emphatically "dirty weather," and bid farewell to

comfortable navigation; for here, between the edge of the Trade Wind and the westerlies, will be found all the sailor most heartily desires to avoid. Indeed, close to the South American coast the squalls are so heavy and lasting as almost to deserve the name of small hurricanes, while the suddenness of their oncoming is not the least of the perils they present to the seaman. Disaster here awaits the careless mariner, coming almost out of a blue sky; security is only to be purchased by constant vigilance. It is, as it were, the preliminary schooling for the mariner who is about to face the great southern sea in all its stern weather conditions after the somewhat enervating luxuriousness of the South-East Trade. Yet this unpleasant region has its compensating advantages. Calms are rare, and irregular though the winds may be, the skilful seaman will so utilize them that he will soon get his ship far enough south to catch the first push of the brave west winds of the southern hemisphere.

And now we come to what is, perhaps, the most wonderful wind in the world, or, more properly, on the earth's surface. A wind that sweeps, with scarcely a break, right round the globe. A wind that, in my own small experience, has enabled a ship to run five thousand miles at an average rate of twelve knots an hour, a ship that is propelled solely by the wind. A wind so steady, both in force and direction, as to require scarcely any trimming of the yards for a week at a time, but withal so fierce, so strong, that everything aloft needs to be of the best, and the courage of the master correspondingly high to take full advantage of it. A splendid wind for a strong

ship and a brave man, but a terrible wind for a weakling. This has been the great racing-ground for the clippers in the days when the white-winged fleets dominated the sea. To this vast stretch of gale-swept ocean the eager skipper looked hopefully forward when fretting in the doldrums and irritated beyond measure by catspaws and dead calms with ever-recurring deluges of rain. As day succeeded day and the track on the chart showed as a closely set succession of dots, a paltry forty or fifty miles between each, the ardent navigator comforted himself by looking forward to the time when, with every square sail set and tested to its limit of endurance, his gallant ship would go flying eastward, spurning the shortened degrees of longitude behind her at the rate of seven or eight a day.

Ah! it is a noble sea and a noble wind, but in order to take full advantage of it certain things are absolutely necessary. Some of them, such as the seaworthiness of a ship and the courage of the master to carry on, I have already alluded to. The latter means very much. I have been in a ship running the easting down under very small canvas, and making very bad weather of it, shipping tremendously heavy water over all, and have seen another ship come flying past, going the same way, with every square sail set and scarcely shipping any water at all. She passed us as if we were anchored, much to the disgust of everybody on board, including the man responsible for our loitering. Another condition is that the master shall know just where to strike the happy mean, the useful parallel of latitude between too much wind and too little. It has often happened

that an earnest skipper, full of confidence in his ship, and eager to make a rapid passage, has gone too far south, not being content with the strength of the wind he had, and found the wind so strong that he could not carry sail to it, or carrying the sail to it has lost his masts, and with them all chance of his making a rapid passage. On the other hand, a too prudent skipper has kept too far to the northward, and found the westerlies so light and variable that his ship could not do herself justice, and he too lost his passage. And, in any case, it is a truly marvellous thing that, in this vast landless region, there should be so steady and strong a wind available to carry a ship swiftly round the world; for as the journey is from America to Australia eastward, so is the passage from Australia to America, still eastward, thrust on that tremendous ocean journey by the strenuous westerly wind. This, however, is carrying us too far for the present, because the great Indian Ocean comes next for consideration, with its wind systems scarcely less complicated than are those of its currents. Still, before leaving the question of the great westerlies for a time, let us be clearly understood that, in spite of what has been said of their persistence and regularity, they do not at all compare with the Trade Winds in the steadiness of flow characterizing the latter. They obey the law of storms and perform the usual revolutions about an advancing axis, albeit their area is so tremendous and their lateral progress so slow, that it often seems to the navigator as if they were blowing steadily in one direction for a week or more at a time, especially if his speed is nearly equal to theirs.

Just a little north of 40° S. the westerly winds begin to lose their distinctive character, and, according to the season of the year, become light and variable. There is, in fact, a line of doldrums between the westerlies (called by meteorologists "anti-trade" or "passage" winds) and the southern limit of the South-East Trade, which is found in the Indian Ocean as in the South Atlantic and Pacific, but with considerable modifications. Naturally the seaman wishes to avoid this belt of variables as far as possible, and thus it happens that when bound to the upper part of the Indian Ocean anywhere, he keeps within the influence of the westerly winds as long as he possibly can without making too great a *détour*, and then hauls sharply northward. Yet I have known cases where daring and enterprising masters, bound to Bombay between April and September, have hauled to the northward very soon after passing the meridian of the Cape of Good Hope, and made the passage through the Mozambique Channel or between the great island of Madagascar and the African continent. But such a course is not usual, and hardly to be recommended (of course, I am speaking of ships dependent upon the wind for the propelling power throughout), for the more intricate navigation, and the greater probability of meeting with light and variable winds far more than compensate for the saving in distance. Yet it must have been used by the early Portuguese discoverers, who would not leave the land unless compelled, and worked their way along a coast without any reference to the time it took, for time was of little value in those leisurely days. But it is time to close this chapter, for the consideration of the

winds of the Indian Ocean, with all their marvellous effects upon the well-being of many millions, is far too interesting a portion of my subject to be entered upon at the fag end of a chapter.

THE WINDS OF THE OCEAN
(*Continued*)

In dealing, however casually, with the oceanic and atmospheric phenomena of the Indian Ocean, it has ever to be borne in mind how radically it differs from the other two great water spaces of the world, the Atlantic and Pacific Oceans. They are both open to the frigid influences of both poles, which, whether we are thinking of water currents or air circulation, are quite sufficient to account for the regularity of their systems. But the Indian Ocean is open only to the Antarctic; at its northern extremity it is bounded by tropical lands, superheated by the fervent sun, except where the mighty mountain chains soar skyward and are clothed in eternal snow, these regions being but a tiny portion of the whole. This being the case, it needs no amount of scientific education—scarcely any, in fact, beyond the exercise of ordinary common-sense—to perceive how entirely different from, and how immensely more complicated than, the wind and current systems of the other oceans those of the Indian Ocean must be.

First of all, consider our old and steadfast friend, the South-East Trade Wind. Compared with its extent in the other oceans, it is here very much limited; but yet, remembering the peculiarity of the Indian

Ocean, it is fairly regular and reliable over most of that ocean between its contracted boundaries, only here it is far more under the influence of the seasons than elsewhere; in fact, it is so encroached upon between October and March from the north that it hardly reaches northward farther than 10° S., whereas in the Atlantic it nearly always extends to the equator, and very often well to the northward of it. Between these seasonal limits, also, its even flow is exceedingly disturbed at irregular intervals by those awful storms known as cyclones or hurricanes, which are more prevalent here than in any other quarter of the world. This fact is quite sufficient to give the passage across the Indian Ocean an unenviable reputation among seamen, and to make them feel more than ordinarily anxious when obliged to be in it at any time between the months mentioned; for, although, owing to the unwearied labours of modern meteorologists, the laws governing these terrible visitations have been accurately tabulated and minute directions given to the seamen how to beware of their approach, how to avoid them, and how to behave when overtaken by them, certain complications are always liable to occur which confound the most careful calculations, and seem to falsify all the instructions given.

I must just digress for a moment, and apologize for not having given more space to this subject of hurricanes when dealing with the North Atlantic, where about the West Indies these destructive storms may be expected in any of the three months, August—October. But there, as will be seen, their area is exceedingly circumscribed; also, their period is brief,

and their course so beset with islands, that the problem of how to handle a ship in them becomes almost insolvable from the lack of sea room. Also, it must be said that their ravages on land are terrible, their course over the cultivated islands being marked by wide swaths of destruction. But as in their distinctive features they vary little, if at all, from the cyclones of the Indian Ocean, the consideration of the latter may be taken as including a description of them.

It has been pointed out before, very briefly, that all storms have a cyclonic or circular motion on an axis, and also a lateral motion, the whole body of revolving air being carried along in some given direction. This movement of great bodies of air reaches its highest speed and most destructive force in the hurricane, wherein the movement of the air attains such a velocity that its effects follow very closely in their dreadful power the other two great natural disasters of earthquakes and volcanoes. The proximate cause of these stupendous manifestations of aerial energy is a combination of accumulated electrical energy with Nature's effort to restore equilibrium in a superheated atmosphere. One of the commonest of weather experiences in our country is the sultry oppressive feeling on a day in summer when the sky is beclouded and everybody feels inclined to pant for breath. All the senses demand relief, and it is felt that relief can only come through a thunderstorm. It usually does, and in a very short time, after a heavy discharge of electricity, accompanied by copious rain and sometimes fierce squalls, the air is cleared, and we begin to breathe more freely. On a vastly larger scale this is the commencement of the hurricane.

The normal air currents have failed to maintain an efficient circulation of the superheated atmosphere, an enormous accumulation of electricity takes place, and all Nature seems to wait in terrified suspense for the adjustment of her forces. The sky assumes a terrible aspect of darkness, with a sort of lurid glow in it, and the heavens appear to solidify and descend upon the earth as if bent upon stifling every living thing. This is all the more dreadful because of its entire contrast to the usual brilliant clearness of the celestial vault in the Trades. Usually it is of a stainless blue, except near the horizon, where a few fleecy masses of cumulus clouds float languidly, their lower edges just slightly darkened, and all the heavenly bodies glow with intense brightness and splendour. Presently the normal flow of the Trade Wind falters and ceases, the mercury in the tube of the barometer, pumping visibly, falls to an extraordinarily low level for those latitudes, and suddenly, when the suspense has become almost unbearable, the hurricane bursts. All the powers of the air in their highest form of energy seem let loose at once. The wind blows with incredible violence, the rain descends in solid sheets, meeting the masses of water torn from the sea surface, and blending with them so that it is difficult to know whether the sufferer is breathing air or water, the lightning is so incessant and so vivid that the whole universe appears to be on fire. The noise, too, is terrific, the roar of the wind blending with the continuous thunder-roll until nothing is audible but this element of uproar. All the senses are affected. Sight is impossible, for what eyes could pierce that stygian darkness, that dense mixture of air and water?

Hearing is out of the question, for no one sound can penetrate that awful chaos of noise. Even the sense of smell is dominated by the excess of ozone in the atmosphere, making it appear as if the air was loaded with the vapour of sulphur. Remains only the sense of touch, which realizes the intense vibration communicated to everything, even solid rocks, by this amazing upheaval of the elements, and gives a feeling of instability to even the most stable objects.

Yet although to the bewildered observer it would seem as if law and order were temporarily in abeyance, and that for a time at least the elements had broken loose from all restraint, in reality law is still supreme, and the whole mass of the atmosphere, even in its maddest violence, moves in obedience to universal law. The storm revolves upon its axis, and proceeds in a given direction withal according to fixed laws, which, if the shipman be conversant with, as he certainly should be, and his ship be manageable, he may gradually work his way out of that terrible circle of destruction. Only at times, when the great revolving storm has reached the end of its ordained path, it may recurve, and, amid confusion worse confounded, fall again upon the hapless vessel, whose crew will be well-nigh reduced to despair at thus meeting what they cannot help deeming to be a new hurricane so soon after the onslaught of the first. But happily this recurving is most unusual.

Thus it has been seen how heavily the placid South-East Trade Wind is handicapped in the Indian Ocean, and how severely circumscribed are its limits compared to those free ranges it enjoys in the Atlantic and Pacific Oceans. In the hurricane season, that is from

October to March, there is a vast area between the Chagos Archipelago, the Equator, and the coast of Africa given over to calms and variable winds, which during the rest of the year is fairly covered by the South-East Trades. And there is also during the hurricane season an encroachment upon the northern border of the South-East Trade by a seasonal series of winds called the north-east monsoons, occupying a great space, speaking generally, of 10° S. of the equator and from 70° of east longitude. But this is far from being a reliable wind, indeed I think it should all be classed as variable, and not be dignified with the title of monsoon at all. And now coming north of the line we find fine weather. It is a bad wind for sailors bound to India, but the weather has abundant compensations. The sky is clear, the winds are light, the ocean serene; in fact, the weather is all that can be desired at sea. But, alas, on land it is another story. All over the vast fields of Hindostan the heavens are as brass, and animated Nature longs voicelessly for a change. The suffering patient ryot paces his parched land, the surface of which is pulverized into finest dust by the fierce sun, and sees the baked earth open in great fissures, huge dumb mouths opening up to the irresponsive heavens. He, with his burned-up crops, endures in patient suffering, knowing that though the heavens be adamant above him relief will surely come, even though it be too late to save his individual life. This tragedy of waiting for the celestial verdict goes on every year, although it has been greatly mitigated by the labours of irrigation engineers, and the carrying out of their great schemes of water storage. Yet even now the

undue persistence of what we in more temperate climes call fine weather, meaning the appearance day after day of cloudless, rainless skies, and the succession of soft dry winds, means death by starvation to millions of our fellow-creatures. We cannot sympathize with them in their dumb patient longing for the change of the monsoon or understand the immense significance of the four words flashed across the wires from continent to continent, "The monsoon has burst." When at last the change does come, it comes with a suddenness entirely justifying the use of the last word of the telegram. The monsoon does burst upon the burnt-up soil, and the long pent-up rain is borne by the on-rushing south-west wind all over the gasping country with a violence that seems as if it would complete the destruction more slowly wrought by the desiccating breath of the north-east monsoon. At first the iron-hard soil refuses to permit the beneficent flood to percolate and the foaming torrents overrun the land, roaring down the crevasses which gape everywhere. The grateful earth swells, revives, and its cruel wounds close up. The barren-looking stalks of the crops, which have long looked dead, revive and put forth their tender green shoots, until in an incredibly short space of time the whole land is clothed in an emerald mantle of surpassing loveliness. Man and beast revel in the delightsome relief, and almost as rapidly as the vegetable world responds to the life-giving call of the heavens by girding themselves with fresh strength, forgetting all their miseries.

But out at sea the sailor mourns, for to him the advent of the south-west monsoon spells dirty weather, which never sailor loved yet. In place of the gentle

breezes and bright skies, the wonderful nightly illumination of the heavens, and all the pleasantness of steady fine weather at sea, he has now to be content with tremendous rains, murky skies that seem to enclose him in a steamy oven, and heavy winds often rising to gale force. It is a time of dread, especially for sailing vessels, where the ropes swell so that they will hardly render through the blocks, and the hands of the mariners, soaked and made tender by the incessant wet, become so painful that it is agony to handle the ropes at all—when pulling and hauling it seems as if the cordage is redhot. In the Arabian Sea the full-powered steamships of the mail and passenger carrying lines, homeward bound, are held back by the furious thrust of wind and sea, and life on board seems hardly worth living for the comfort-seeking passenger, often getting his first taste of Indian weather.

In the great indentation between Hindostan and Burmah, especially on what is known as the Coromandel coast of India, this tremendous visitation of the south-west monsoon is robbed of all its terrors for the seaman and becomes mild and pleasant. Because it has already done its great work, fulfilled its mission of revivifying the arid, sun-baked plains of India, and emerging upon the sea once more, its exuberance is thoroughly subdued, its stores of rain are all expended, and consequently it greets with a gentle mildness the sea from whence it came so boisterously. But by the time it has crossed the great Bay of Bengal and has reached the coast of Burmah, it has regained much of its original strenuousness and has replenished its stores of rain, so that it strikes that part of Asia with

hardly less violence than that with which it first greeted India.

It must, however, be noted that this rough quality of the south-west monsoon, so unlike the gentle steady character of its parent, the South-East Trade Wind, is not maintained for any length of time. Having "burst" upon the Indian continent in fury, it soon settles down and becomes more sedate, although the "dirty"—that is, the rainy and squally character of its weather—persists more or less all through the season. As regards its direction, although it is called south-west, that being the general quarter from which it blows, it must be remembered that it is subject to many local divergences, more especially when it strikes the East Indian Archipelago, with its high mountain ranges lying at different angles to each other, and all having a modifying effect upon the prevailing winds. This, I think, will be fairly well understood because of previous references to the effect upon the wind of intervening land.

And now it is time to enter the greatest of all the oceans, the vast Pacific, of far greater area than the Atlantic and Indian Oceans lumped together, a water space wherein might be dumped all the visible dry land of the globe and no trace of it remain. The islands which punctuate this mighty ocean can have no appreciable effect upon its winds, for with but few exceptions they are very low, just cays crowning coral reefs, atolls with occasional evidences of volcanic agency raising their enclosed islands higher than usual above the sea-level. But first a word or two as to the general character of the winds over this vast water space. Surely never was an epithet less deserved

than that bestowed upon this, the greatest water space in the world, the Pacific or Peaceful Ocean. If any ocean deserved such a name it is the South Atlantic, where from generation to generation since the dawn of navigation broke, and for who knows how many ages previous, the gentle wavelets have been unruffled by anything more strenuous than a moderate breeze. I speak feelingly, for of all the seas I have sailed I know none so intimately as the Pacific, having spent so many weary months in traversing it to and fro, not bound anywhere, but just hunting for a section of its native population, the great sperm whales. To give it its just due I will freely admit that along the line in that vast expanse of open sea extending from America to Asia, no worse weather as regards winds may be met with than in the Atlantic; but, indeed, that is not saying much. When we come to consider the enormous area between the line doldrums and the extra-tropical region of the counter Trades, or westerlies, as seamen prefer to call them, which in the South Atlantic is so sacredly pacific, we do not find anything like the same stability of weather in the South Pacific that obtains in the South Atlantic. The awful hurricane is fairly frequent, and the beneficent South-East Trade Wind is unreliable, given to vagaries unaccountable, except upon the hypothesis that the predisposing causes of Trade Winds, the superheated continents adjacent, have less power by reason of their absence on the west and their entirely different configuration on the east.

Each of the three great oceans of the world has a character entirely its own. The Atlantic is, perhaps, the most perfectly amenable to regular meteorological

variations of the trio, bounded as it is, within reasonable limits, by America and Africa on the west and east in the southern hemisphere, America and Europe in the northern hemisphere, and on the north the frigid continent. All these exert their influence upon the winds, and through them the destiny of the nations adjacent. On the other side of Africa the abnormal conditions resulting from a hemming-in of the great Indian Ocean by the torrid northern land has, as we have seen, given it the special character of the monsoons varied by hurricanes, instead of the North-East Trades, as in the other oceans—its South-East Trades severely disturbed by hurricanes and encroaching monsoons. But the Pacific Ocean might reasonably be expected to bear, in its wind system, a very close analogy to the Atlantic, and, speaking generally, it does do so. That is, it has its North-East and South-East Trades and its anti-Trades, or passage winds, north and south of them, while they are divided by the usual belt of equatorial doldrums to the north of the Equator.

But when we come to particulars, we find very wide divergences between the winds of the two oceans, and as we study the matter more closely, we see that it was unwise to have expected too much similarity between them, the conditions being so very different. In the first place, looking northward into the South Pacific, we see on the west, instead of the great American continent extending almost down to the frigid zone and protecting the enclosed ocean from the boisterous westerly gales, only the great Australian island and the small New Zealand group, which present no practical barrier to the fierce sweep of the brave

west winds below 40° S. Then the Australian land interposes its mass up to the equator, the whole of its coasts subject to violent gales, eddies from the south, where the almost perpetual westerlies sweep along unhindered. In this stormy character of its coast Australia differs entirely from South America, which, from 40° S., at least, to the equator, is practically galeless, heavy winds, except for an occasional squall, being almost unknown. Proceeding further north, the eastern side of the East Indian archipelago compares fairly well with the chain of the Antilles in the North Atlantic, but there is an important difference between the two that will at once strike the observer. The West Indies stretch across the entrance to a gulf whose remote extremity is blocked by land entirely, the East Indian archipelago being distributed over an ocean through which the wind may freely blow—and does; for the north-east and south-west monsoons of the Indian oceans extend far into the Pacific, being felt in the meridian of 150° E., while a north-west monsoon, ranging from 10° N. to 10° S., and embracing with its influence the three great islands of Borneo, Celebes, and New Guinea, with their multitudinous offshoots, stretches as far as 160° E. Such a phenomenon is unknown in the South Atlantic, where the North-East Trades dominate the whole of the West Indies, except for local variations, never extending far from land. And on the other side of the ocean, where the mighty mountain chain of the Andes extends through fifty degrees of latitude, there is entirely wanting that peaceful sameness of wind and weather which obtains in the corresponding region of the South Atlantic, bounded as it is by the

comparatively level land of the South African continent. Gales, with variable winds and heavy squalls, may be experienced all along this gigantic littoral, where the winds are baffled by the heaven-exploring summits of the greatest mountain-chain of the world, rising as it does almost from the ocean's margin, and, by its barrier to the rain-bearing clouds that endeavour to pass to the eastward, producing the mightiest series of rivers on the planet.

But in between these two disturbed areas of east and west there is the enormous water space of the South Pacific proper, where the finest weather of the Pacific may be found. Over, roughly, one hundred and ten degrees of longitude and thirty degrees of latitude the South-East Trade Wind is free to wander undisturbed. No land save a few scattered islands, none of them of any appreciable area or height compared with the ocean that surrounds them, is able to hinder the even flow of the steady Trade, and yet its steadiness is in no wise to be compared with that of the beautiful South Atlantic wind. Within the very heart of the Trade are to be found great patches of calms and baffling winds, as if the vast currents of air, bewildered at the unhindered openness of their course, faltered and failed for lack of position. Here, too, are hurricanes, as in the Indian Ocean, but with far less apparent reason. The casual visitor to the South Sea Islands, struck with the halcyon character of these sunny seas, gazes wonderingly upon the houses of the natives, strongly moored to stumps of coco palms by cables of coir rope, spun with immense labour by the busy fingers of the natives. When he asks, as I have heard him, "Why do you tie your houses down with

big ropes like this?" the gentle native strives to explain to him the incidence of the awful hurricane, when sea and sky seem to meet and the whole surface of the islands appears in danger of being swept off into space. Not that the South Pacific hurricane is any more deadly in its force than the East or West Indian variety, but these low-lying coral-reefs feel its impact more, since for them there is no shelter. The mind can hardly conceive the horror of great darkness which falls upon the islander, whose habitation is only a few feet raised above the surface of the sea, when the unimaginably furious hurricane and its attendant waves come sweeping through the gloom upon his tiny patch of sand, moored safely, it is true, as far as the holding of its place in mid ocean is concerned, but liable to be swept clean by the besom of destruction surging over its surface. There are many islands, of course, which are not so disadvantageously situated. Being of volcanic origin and high in places, the trembling inhabitants may and do take refuge in holes and caves in the rocks, hiding there in safety until the awful crash of celestial warfare has subsided, and peace once more smiles benignly over the sun-gilded ocean.

These aberrations of the normal flow of the South-East Trade are, I think, quite sufficient to deprive the Pacific of any real claim to its name as against the South Atlantic, but it is not until we get into the North Pacific that we find how serious are the divagations from fine weather indulged in by this peaceful ocean. It is with seamen generally an axiom that when within the tropics, either north or south, you may bend your fine-weather suit of sails, because,

except for an occasional squall, you will not have any really heavy wind. But really that remark only applies to the Atlantic Ocean. As we have already noticed, during the south-west monsoon in the Indian Ocean the wind often rises to gale force, and the weather is emphatically *dirty*, while during the north-east monsoon the dreaded hurricane is always probable. But in the North Pacific, either on the American or Asian coasts, the weather is frequently of as bad a character within the tropics as it is without, excepting, of course, that it is not so cold. From December to May, on the coasts of Mexico and Central America, the weather is fairly fine, but during the rest of the year it is really bad, and the mariner must be prepared not merely for occasional squalls, but for frequent heavy gales, extending for several hundreds of miles off the coast and often lasting for four or five days, such conditions, in short, as are unknown in the North Atlantic in the same latitudes. And as the weather is on the American coast, so it will be found on the shores of China and the Philippines: unpleasant, uncertain, and gusty, not to say frequently of gale force—all of which conditions are only what may be expected from the physical circumstances of environment, but all militating against the right of this great ocean to be called the Pacific.

When we get farther north all the unpleasant conditions of the North Atlantic, the Western ocean of the sailors, are reproduced and accentuated. The great oceanic current which sweeps northward along the Japanese coasts as the Gulf Stream does along the shores of America produces, by reason of its warm waters and the cold atmosphere above, the counterpart

of the Newfoundland fogs, making the navigation of the coasts north of Japan exceedingly difficult; in fact, the Kurile Islands, which extend from the northern island of Japan to Kamchatka, are so-called from a Kamchatkan word signifying smoke, since they are nearly always veiled in fog as dense as smoke, which is thickened by the smoke from active volcanoes. And since the Japanese stream has not been so fully warmed as the Gulf Stream by a sojourn in an equatorial basin, and a cold counter current hugs the shore from the north, the northern coast of Japan, Siberia, and the Kuriles are, although not really very far north, quite Arctic in their temperature, while the frequent gales that blow make the whole region inclement in the extreme, and, from the sailor's point of view, detestable. Indeed, this part of the North Pacific may well challenge the corresponding latitudes in the North Atlantic for the pre-eminence in vile weather, but fortunately for sailor-humanity it is, compared with the North Atlantic, an unfrequented sea.

The western coasts of British North America, too, although in about the same latitude as our own favoured land, are in the winter quite hyperborean in character, the Pacific current answering to our Gulf Stream having failed to bring them the warmth they need from the far distant curves off the East Indian archipelago, where it begins its eastward course. But the whole of the North Pacific above the tropics is a stormy, troubled region, where ice-laden gales rage over vast sea surfaces, and prevent the adjacent lands from being pleasant places of habitation, with the emphatic exception of California, perhaps the most delightful climate in the world.

Not that I am at all forgetful of the claims of British Columbia, which in summer is beautiful beyond belief. Moreover, although it does not strictly come within the purview of the ocean winds, we must remember that by some wonderful law of compensation even the bitter blasts of winter raging in from the North Pacific are robbed of their severity by the intervening range of the Rocky Mountains, and descend upon the fertile plains of Manitoba in mild beneficence, making that favourite portion of British territory far more habitable than the bitter wastes of Arizona and Dakota, far to the southward of them.

This hurried and entirely incomplete survey of the wind systems of the world may here be brought to a close, because to deal with it more closely would be encroaching upon another question of great importance, viz. the effect upon the world of the ocean in the matter of health, and the all-important part that the winds play in the dissemination of that incalculable blessing to the teeming population. But I think it will be readily understood how inextricably interwoven all the phenomena of the sea are in their effects upon the world at large, so that it is not possible to treat one portion without mentioning the other. It must also be borne in mind that although the navigator can never be entirely independent of the wind, whatever be the mechanical power of his ship, the direction and force of the winds are to-day of far less importance to the trade of the world than they were before the advent of steam, when the passage of ships from one part of the world to the other was entirely dependent upon the wind for its success. Then the prime qualification for a successful seaman

was his knowledge of the winds at all seasons and in all the oceans, knowledge which in some men attained an almost superhuman height of excellence. But, after all, the work of the winds as motive power for ships was even then of small consideration compared with their work in acting as the lungs of the world. The vast and regular influences of the atmosphere about the surface of our globe, fraught as they are with consequences of the highest import to mankind, have ever been made the subject of earnest inquiry by only a very few, and even those who have devoted a lifetime of closest research into the causes and effects of the wind have had to confess that the fruits of their labours have been scanty, while the laws that govern the movements of these mighty elemental currents are even now but imperfectly understood.

Much ignorant ridicule has been poured upon the work of meteorologists, and a great deal of obloquy, quite undeserved, has been meted out to them because of their frequent inability to predict coming storms and changes of weather. But if those who scoff and jeer would only pause to consider the difficulties under which those devoted scientists labour, we should perhaps hear less of the pseudo wit levelled at weather prophets. Even to-day the words of Holy Writ remain true, and apparently are likely so to remain: "The wind bloweth where it listeth, and thou hearest the sound thereof, but canst not tell whence it cometh or whither it goeth."

Unfortunately, while the labours of scientific meteorologists, aided by observation of the most carefully constructed instruments, and a splendid service of

telegraphic communication, meet with popular ridicule, the empirical guesses of advertizing weather prophets, without any other mental equipment than audacity, still continue to impose upon the public credulity, and there are enormous numbers of people to-day who believe that a man without instruments, without scientific knowledge of atmospheric conditions, and without telegraphic information of what is going on over vast areas of land and sea, can accurately forecast the weather, not merely for days in advance, but for years to come.

THE CLOUDS

In common with nearly all the aerial phenomena, clouds are accepted by most of us as a picturesque adjunct to our daily life without our giving even a passing thought to their work or their influence upon our existence. Their beautiful, ever-changing shapes, their evanescence, and the part they play continually in our determination of our duties or pleasures, make a superficial impression upon us; but it is only here and there among a select few that any determined attempt is made to understand them. The poet and the painter love them in esoteric fashion, the one because they pre-eminently lend themselves to poetic fancy in their mystery, their elusiveness, their celestial home, and the glamour that always surround that which we can see, whose effects we can feel, yet whose forms we cannot determine by touch or any of the strict laws of sense. The wayward genius of Shelley has made, perhaps, the most complete picture that words can produce of the clouds, and at the same time the most scientifically accurate, which, strangely enough, in the estimate of most people, is the principal attribute of true poetry. The poetic imagination has in numberless cases outstripped scientific research, and laid down in splendid wealth of allegory and metaphor laws which have afterwards been tabulated by the

plodding labours of men of science. Some day, I trust, some painstaking scribe will complete a noble volume of testimony to the prophetic insight of the true poets, and award them their meed of praise as the world's greatest discoverers, men who without one iota of scientific training, without reasoning or scientific deductions, have leapt at conclusions profoundly accurate, and stated them in melodious verse that has become enshrined in the nation's most precious literary treasures.

The painter, again, finds in the clouds at once his greatest inspiration and his despair. The unspeakable beauties of the heavenly embroideries in their form fires his imagination and energizes his pencil; but how can he ever hope to fix their shapes upon canvas when they are never for a moment the same, and each succession of outlines is lovelier than the last! Let it be set down to the credit of the dauntless human mind that it perseveres in the face of so great discouragement, for no sooner has he fixed upon his canvas what his artistic eye has told him is an almost perfect series of lovely forms than another appears and clamours to be limned; and he feels that, do what he will, he can never be sure that he has fixed the best. But if this is so with regard to the shape of the clouds, what about their colour? Nothing surely can bear more eloquent tribute to the patience, the skill, the genius of the painter than the way in which he has wrestled with the utterly impossible task of portraying with man-made media the unreproducible glories of the heavenly panorama. Change of form in clouds are rapid, yet so gently do they occur that we can hardly, even while watching them

most closely, say how or when the change has taken place. Yet these changes are slow and their motion abrupt as compared with those that proceed in the tinting of the clouds. To watch the tropical dawn unfolding, from the appearing of the first pale suggestion of light overhead, the first hint of the daily miracle about to recur, to note breathlessly how the sombre violet of the night becomes suffused with nameless gradation of colour, rather an infinite series of shades than of positive colour, is to the trained eye at once a delight and a profound sense of impotence, of inability ever to comprehend what colour is or can be. Can you not imagine the artist standing palette on thumb and pencil poised, hardly breathing because of suppressed excitement, the dauntless human soul within determined to endeavour the impossible, until the wearied eye droops in the attempt to convey its impressions to the receptive brain in the presence of such fleeting, such elusive loveliness? And as he gazes entranced there steals into another corner of his brain the sense of defeat, coupled with the assurance that, be his power ever so great, his perceptions ever so keen, he will never be able to satisfy himself that he has grasped, even remotely, the beauty being poured out so lavishly before him, and that however far short his best efforts have fallen of the palpitating reality, the beholder of his picture will scout it as extravagant exaggeration.

We are told that the Greeks, though their sense of form was perfect, had but little perception of the wonderful gradations of colour. May it not have been rather that, looking upon the sky, they felt in their acutely logical minds the utter impossibility of

ever doing justice to the heavenly colouring with the poor and limited pigments of earth? I do not wish to dogmatize upon so much vexed a question, but I sincerely put this suggestion forward as a possible solution. Since their day artists, greatly daring, have endeavoured to fix upon canvas their impressions of the amazing beauty of the sky, and some of their pictures are marvellously beautiful; but even the best of them, while filling us with admiration for the power of the artist, leave us always, as they leave their creator, with a sense of something impossible of attainment, a great falling short of the true portrayal of Nature's loveliness. Then after the beautiful consider the terrible — the storm-cloud, the appearance of the sky before a hurricane, with its lurid glow as of a mixture of molten metals, and the infinite network of vari-coloured lightnings threading the swart masses. Many artists have drawn upon their imaginations for the reproduction of what they consider the infernal regions to be like; but all of them fall very short of the reality of the hurricane sky, which, only to witness, fills the stoutest soul with an indefinite dread.

But while I cannot deem it necessary to apologize for thus dwelling at first upon the picturesque and æsthetic side of Cloudland, I think it is time to turn to the natural use and development of these beautiful adjuncts and auxiliaries to the mighty work of the ocean. First of all, let us consider the most common, as well as the most beautiful, form of cloud, the cumulus. Like a vast and continually changing mass of wool of the whiteness of snow, this lovely form of cloud goes sailing placidly across the deep blue

of the heavens, restful to the eye, and filling the mind with the idea of peace. As its name imports, it is an accumulation of vapour held together by some mysterious power of cohesion in the atmosphere, at no great height above the earth, and only to be seen in its full beauty in fine weather and light winds and calms. It is essentially a summer cloud, and its full beauty and charm can only be enjoyed when the sky is serene and the wind is not too strong. Perhaps it is seen in its full perfection in those peaceful regions of the sea where the Trade Winds blow. All sailors are familiar with what they call the Trade sky. Overhead the sky is almost free from cloud, except for the fleeting mass, like a lonely wraith, passing in stately fashion across the blue expanse, and, when coming between the sun and the beholder, giving a grateful if momentary sense of shade from the fervent heat of the great luminary. And its shadow upon the shining sea may also be very clearly followed, owing to the alteration it makes in the beauty of the glittering wavelets. But, for the most part, the cumulus clouds lie piled around the horizon in masses often called mountainous, but utterly unlike mountains in their entire absence of angles. Their outlines are of the softest, roundest, and most intangible. They appear to be motionless, but a close and careful watch will show that slowly, almost imperceptibly, but constantly, they are changing their shapes, never, however, assuming any similitude that is other than beautiful. Occasionally there will be seen along their lower edges comparatively straight lines of darkened cloud, showing the indication of the presence of a greater quantity of moisture in them than usual to

form nimbus or rain clouds, of which more anon. The time to study these clouds is at dawn, when the heralds of the coming sun touch and glorify them. At night, in their pure whiteness under the glare of the silver moon, they look cold, and when they glide across the face of the satellite they cast quite a gloom over Nature, which we instinctively resent. Even then they do not cease to be beautiful, but they do not appeal to our senses as they never fail to do in the daytime.

They are the lowest of all the clouds, so low in fact that it is not necessary to scale a very high mountain in order to get among them and experience the same sensations as we have when enveloped in a heavy mist, which is indeed a cloud in contact with the earth. Sometimes we may see them clinging around a mountain as if held to it by some invisible power of attraction and investing it with something of their own mystery and impalpability, hiding its grim outlines, and parting with much of their moisture for the replenishment of its springs. In many parts of the world their thus clinging to a mountain is an infallible sign of bad weather shortly to arrive. A notable instance of this is the well-known "table-cloth" on Table Mountain, Cape of Good Hope. For some time before the coming of one of these tremendous gales, known and dreaded on the South African coast as the south-easter, a huge mass of cumulus cloud is seen resting upon the plateau at the summit of the mountain which gives it its distinctive name, completely hiding it from view, and sometimes, indeed, rolling down its sides as if it would completely envelop the whole giant mass. Even when the storm does commence, the clouds still cling to the mountain

as if it had some potent attraction for them which they were unable to resist, although they may be seen streaming away to leeward like snowy meteors. And this phenomenon may be witnessed wherever there are mountains, in a greater or less degree, according to their attitude and geographical position.

Next in point of interest as well as beauty comes the curious cloud-form known to meteorologists as the cirrus. These are of a totally different character to the cumulus or heaped-up clouds, whose greatest height above the earth is estimated at three miles, and whose form, as we have seen, is continually changing. The cirrus or "curl" clouds float far above the cumulus in the region of intense cold and rarefied air, and are composed of minute ice crystals or spiculæ. It is a curious and beautiful sight to see how steadily they will maintain their position and shape in the upper ether when the cumulus clouds are flying along underneath them, borne upon the wings of the earth wind, as we may, somewhat fancifully, perhaps, designate the lower currents of air; not that the cirrus is stationary by any means, but its vast height above the earth makes its motions appear very slow, indeed almost imperceptible, unless compared with some stationary object, such as a mountain-peak or a tower. Streaming over the blue sky in graceful feathery wreaths, they betoken unwonted movement among the upper air currents soon to have a disturbing effect upon the earth wind, and hence are considered by sailors as sure precursors of storms. In fact, there is a sea-rhyme of undoubted antiquity which runs—

> "Mackerel backs and mares' tails
> Make lofty ships carry low sails."

The mares' tails being the wispy curling wreaths of cirrus cloud, and the mackerel backs the fluffy little combinations of cirrus and cumulus cloud that are known to the weather-wise as the cirro-cumulus. Few of the celestial pictures presented by the clouds are more beautiful than that often presented on a fine summer's day by the mackerel-back clouds lying in their long rows of fleecy tufts against the delicate azure of the sky, and giving it a curious dappling of white and blue, which is exceedingly charming in its prettiness. And when this arrangement of the higher cloud-forms obtains at sunrise or sunset, and catches the sheen of the sun's rays, the effect is gorgeous beyond all power of words to describe with any approach to adequacy.

But beautiful and picturesque as are these higher cloud-forms, it is difficult indeed to say what useful purpose they subserve, or how they minister to the great combined work of the atmospheric and oceanic phenomena. Floating high above the turmoil of the lower air strata, they appear to the imaginative mind as dwelling apart in serene aloofness, having no part or lot in mundane matters. Of course, as they are a part of our atmospheric system, they must perform their allotted task in their appointed way; but what that task is, or how it is performed, is far beyond our ken. The work of the cumuli is comparatively easy to understand, as well as their decorative value, although one part of that work—the gathering and storing of electricity—is sufficiently mysterious to puzzle the deepest thinkers of the world, who, indeed, have not yet been able to say what electricity is. Most likely the work of the cirrus is just as important, but until

we know what it is, we must be content to admire and wonder at their marvellous beauty, assured that their use is no less wonderful. One thing more must be noticed before leaving this interesting series of cloud-forms, and that is the important part played by the low-lying clouds in preventing excessive radiation, that is, in stopping the heat which has been absorbed by the earth during the day from the sun's rays from escaping too rapidly into the air. The process is familiar to most of us. How often do we say, when the sky is very clear and the stars twinkle, not a cloud being seen, "It will be frosty to-night." We realize the effect while not thinking of the cause. The work of the cloud is similar to that of the cosy on the tea-pot (a most pernicious institution, by the way, and a dire agent of indigestion), or the blanket on the bed —not to keep the cold out, according to the common error, but to keep the heat in; in scientific words, to hinder radiation. Again, how frequently do we complain, on a cloudy summer day, of the weather being close or muggy, when we might (and do) wonder that, the sun's rays being shut out from us, it is not cooler than usual. Well, in the first place, the vaporous cloud is co-operating with the moisture arising from the earth to keep the air damp, while it prevents the heat from escaping into the upper regions, and so we are subjected to that most depressing of all physical conditions, moist heat.

These gentle, amiable forms of cloud are of the summer, as the lightness of their appearance would denote. They belong to bright and sunny conditions, and as such are, however unconsciously, beloved by us. But as the night is as beneficial in its way as

the day, and winter as good for man as the summer, if not so enjoyable, so the less beautiful forms of cloud which we have now to consider, though undoubtedly not so pleasant to any of the senses, have all their appointed tasks to perform for the benefit of the animal and vegetable kingdoms, each in his own order, each perfectly fulfilling his allotted duties, and as such to be appreciated and admired, if not for beauty, for utility. Those long, low-lying streaks of leaden-coloured cloud, which seem to hang so heavily in the sky without grace of outline or beauty of colouring, are called "stratus" clouds, a name which fits them exactly. They belong to the night or the heavy day, and when they spread over the whole sky and shut out the gay sunlight, they have a depressing influence upon the spirits, which is extremely marked. They are pre-eminently useful in preventing radiation of heat from the earth, and are seen only in parts of the world where such a prevention of the escape of heat is needed. Unlike any other of the lower clouds, their movement is slow, as slow and imperceptible as that of the cirrus of the higher regions and its allied forms. They often form an admirable foil, from a spectacular point of view, to the beautiful cumulus. Like a solid sombre base they lie close to the horizon, and upon them sit airily the fleecy volumes of snowy cumuli in all their glory of contour and evanescence of outline. Stern and grim, they impart to cloudland an appearance of stability, which, as it deepens into gloom, we cannot help resenting, for whether we will or no, they depress us with a sense of impending disaster, which is not at all warranted. And when, as is often the case on a sultry summer evening, their

heavy layers are occasionally shot with lambent lightning, the more susceptible portion of humanity looks fearfully at them as if they were the breeding-place of heaven's artillery, and does not pause to ascertain whether there be any ground for apprehension.

But it is when they overspread the sky by day or by night that they exercise the profoundest influence upon mankind, or, indeed, the animal kingdom generally. An overcast day, whether in summer or winter, affects us more than we imagine, or, if we did, would care to admit. It is true that this disconcerting phenomenon is sometimes due to what is known as a high fog, generally in summer producing a dark day; but in any case its effect is the same. It is, then, hard to realize that only a few thousand feet above our heads there is brilliant sunshine, and that the hiding of the glorious light is only temporary. Undoubtedly this overspreading of the sky with a pall or pallium of cloud is an important factor in weather-breeding; but we unscientific folk do not reason about that, we only feel, and if any one were to reason learnedly upon it to us, the probability is that we should listen listlessly, and, shrugging our shoulders discontentedly, wish disconsolately that it would clear up.

Sometimes, indeed, the stratus breeds a feeling of positive terror. I remember very vividly on one occasion, when becalmed in mid-Atlantic on a night in January, homeward bound from the Gulf of Mexico, a great sheet of stratus thus overspread the sky. It crept across from east to west, gradually hiding the blue vault, with its myriad points of light, until we were wrapped in what I could only think was

Egyptian darkness, that which might be felt; and with that darkness came silence so profound that the creak of a block or the flap of a sail, unnoticeable at other times, became a noise and startled us. Alarmed, the captain gazed earnestly at the barometer, but it remained steady, gave no sign of any approaching change. Men spoke in whispers, as if afraid of being heard by some one. Parti-coloured flames of electricity played about us now and then, and in the intervals between them the darkness seemed so tangible that we were tempted to reach upward and see if it might be touched. It was a night of terror, of fear of the unknown possibilities of the weather, and, above all, of the lightning which played about us incessantly and threatened us, as we thought, with the firing of our cargo of cotton. But, behold! towards morning, the heavy black pall, which had apparently been shutting us in with terrors impossible to define, gradually rolled away, the shy stars peeped out, and the ineffable glories of a perfectly clear calm night at sea were revealed. There was practically no wind throughout the whole affair, and no rain at all.

Yes, the stratus is a harmless cloud, if unpicturesque to the last degree, and bearing the same relation to the decoration of the sky by the cirrus and cumulus as the good, dark, newly-upturned soil does to the loveliness of the blossoming hedgerow. Yet I cannot help thinking that when the stratus and cumulus combine, and the dark heaviness of the former infects the fleecy whiteness of the latter, we get the most useful as well as the most threatening in appearance of all the clouds, the nimbus or rain-

cloud. Now, in meteorological terminology a nimbus cloud is one which is not only dark, even black, but from which rain is actually falling. Now, although I have not the least desire to question the conclusions of Luke Howard, Clement Ley, and others who have made clouds the principal part of their life study, I feel that the last clause of this definition of a nimbus cloud is superfluous and really unwarranted. For instance, who that has ever been in Malta in the summer and seen the mighty masses of rain-laden cloud passing over the parched island without shedding one drop of their priceless contents, could fail to understand that although these celestial reservoirs were indeed nimbus clouds the rain was not actually falling, and for some curious reason refused to fall where it would do an enormous amount of good? Often I have wished that it were possible to send a shell laden with high explosives soaring into the bosom of one of those vast clouds, and make it let fall its flood of blessing upon the fertile land which lay white and arid beneath, yet ready to be clothed with living green in a few hours at the touch of the literally golden rain. Only it is a daring thing to meddle on such a grand scale with Nature's operations. Such an interference might possibly result in whole terraces of laboriously piled-up soil being washed away by the tremendous impact of the descending flood, leaving only bare rocks to greet the hapless peasant; for rain is one thing and a cloud-burst is another, as many unfortunate farmers have found to their bitter cost.

Which brings us to a consideration of the most important cloud-form of all in its effects upon the

services to mankind, the cloud we have just mentioned, the nimbus. It is not the least of ocean mysteries, the way in which its bitter waters are suddenly, in a few minutes, converted into sweet, drinkable fluid and elevated into the sky by thousands of tons. There it is received and retained by immense reservoirs of mobile shape, of entirely intangible material, and conveyed by the agency of the winds to those regions where it is needed. Pause a moment and think of the utter marvellousness of this miracle. The civil engineer planning the water supply for a town must needs employ for the storage of the water the strongest material and the utmost skill in using that material, water being at once so weighty and so insidious in its never-ceasing efforts to escape from the confinement against which it rebels. Moreover, unless the engineer can find a source of supply higher than the site of the town for which he has to provide, he must of necessity instal, at tremendous cost, vast pumping machinery, not only for the collection of the water but for its distribution. And, again, his sources of supply are liable to failure, to contamination, to being tapped—very likely quite unconsciously—by the engineers of rival or similar schemes. Compare these costly hindrances, these laborious preparations, with the simple ease of Nature's inexhaustible supply. In the first place, consider the celestial reservoir itself. There is no matter for wonder in the fact of an enormous quantity of water floating about in the sky in the form of vapour as in the cumulus cloud, for really the moisture in them is of the character of gas. But the nimbus cloud, although of the same intangible, tenous

nature as any other cloud, can and does hold, as in a vast bag, a mass of solid water hundreds of tons, yea! even thousands of tons in weight, and, propelled by the wind, carries it for enormous distances until some external force, such as collision with a mountain-top, the rending force of electricity, or the atmospheric concussion of the thunder, splits the impalpable envelope apart and lets its contents fall.

Now in this there is no flight of fancy; the fact is indisputable, and if any confirmation of it were needed it would be found in the often-recorded cases of small fish and immature frogs which have been carried for immense distances in the bosom of a cloud as in an aerial lake, and then let fall, scattered over the land to the utter amazement and often superstitious fear of the beholders. What is even more wonderful, if that be possible, is the manner in which the water of the ocean is raised in such masses to such a tremendous height into the air; also how, in the brief space of time occupied in its transmission, that water is robbed of its salinity, becomes fresh and sweet. It is quite easy for even a low order of intellect to comprehend how, by the process of condensation or evaporation, the solid matter in the sea, the saline particles, are left behind, while the purified vapour rises into the air under the influence of the sun's heat. But this throws no light upon the much-debated question of the water-spout, of the way in which a previously prepared cloud sags down to the sea and extends a long hollow pillar of its own material downwards until it makes a juncture with the waters beneath, agitated in sympathy with it. I have touched upon this matter before in these pages, but offer no apology for referring to it again

as being one of the most important, as well as one of the most mysterious, operations of the deep sea.

Let me briefly recapitulate the process in the most superficial manner, which is all any one can do, since the inner workings are hidden from our eyes in the arcana of Nature. All the conditions being favourable, one of them being obviously a great amount of solar heat—since the development of a waterspout never takes place in cold weather or at night—a collection of clouds approach the sea. There is little wind, for it is obvious that a swiftly-driven cloud would be quite unfit for the leisurely sucking up of a great mass of water, and the dark masses of specially prepared vapour lower over the surface of the comparatively smooth sea. It would appear, too, as if the sea was specially prepared in some strange fashion for what is about to take place, for whenever or wherever the long pendant or tube of cloud approaches the sea surface, the latter becomes violently agitated in a circular direction, looking, indeed, as if it were striving to reach upwards to the sky. Quite a mound of water appears, to the summit of which the pendant of cloud, which has apparently excited this sympathy, presently reaches and joins itself, when immediately the process begins. There is now a flexible column reaching from sea to cloud, so flexible indeed that it may be seen swaying about; so tenuous that through its walls the water may be observed rushing upwards with a spiral movement as plainly as if the observer were watching the operations of a gigantic pump whose receiving-pipe were of glass. Only in this case there is no spasmodic pulsation of the water such as a pump compels, there is a steady upward movement in obedience

to some irresistible suction. While this is going on, the lading of the cloud above is clearly evident. It spreads, grows baggier, blacker, and more threatening in appearance, until at last its limit of storage capacity being reached, there is an automatic cessation of the great machinery. The tube dwindles rapidly until it becomes a mere thread, then continuity ceases—I cannot use the harsh word "break" in this connection—and with that cessation of the juncture between sea and cloud, there is a closing up of the pipe, almost a hermetic sealing as it were, and the disconnected tube shrivels away until at last it is even as a mere excrescence upon the bottom of the sagging cloud above. Presently even that is smoothed out, and, like some richly-freighted argosy, the cloud sails majestically away upon its beneficent errand.

Accidents happen, of course; what situation is free from them? Sometimes a sudden shock of lightning or thunder will break the tube in the middle of its work, and cause a terrific return of the raised water to the sea with a roar like that of Niagara. This is occasionally brought about by human agency, and proves conclusively the amazing tenuity of the cloud which can yet sustain so vast a weight of water. The master of a vessel, nervous for the safety of his ship, in close proximity with the waterspout, will cause a gun to be fired, not necessarily at the spout, but in any direction, and in the concussion of the atmosphere the radiating air-waves strike against the water-laden cloud column, break it, and all the mass of water, both raised and in process of raising, returns to the sea with a tremendous crash. The idea may be a very fanciful one, but I have often wondered whether it might not

be possible to trace the ruin and misery of the inhabitants of some inland town or village enduring a water-famine to the nervous act of some petty skipper fearful for the safety of his ship, who, by some such act as I have described, has destroyed the celestial water-bearers whose mission it was to supply that far-away community with the indispensable gift of water. The idea does not seem so far-fetched after all, does it?

But let us now picture the great assemblage of clouds, laden with water, moving majestically off on their appointed errand. They have to run the gauntlet of many dangers to their unpurchasable cargo. The willing winds bear them swiftly upon their way, but in their passage they may and often do collide with each other, and spill the treasure back into the already overwealthy sea; or a thunderstorm may occur with the same effects; or a failure on the part of the wind to maintain its force may cause the cloud to delay until it gradually melts away; or borne straightly towards its destined goal, it may at the last moment be diverted otherwhither, and expend its valuable load where it is not wanted. Yet such is the magnitude of the provision made, that the occurrence of these many accidents matters little. Nature, in her arrangements for the life and health of the world, is *lavish* beyond belief. She provides millions of eggs in the fish in order that about five per million shall survive; she covers the fruit trees with such a wealth of blossom that if all of it fruited the trees would collapse, in order that ten per cent. of the promise shall be hailed as a good crop; and she loads the nimbus clouds of the tropics with countless millions of tons of water for

the service of the earth, in the firm knowledge that one per cent. of the total provision will be utmost abundance for the need of every living thing.

But let us watch this homeward hastening cloud. Is there any magnetic sympathy between it and the source of yonder great river, issuing first in a trickling stream from the bosom of a great mountain on the sea coast? At first we are tempted to say, "Ridiculous! these matters are ruled by law, the law of averages; but here the law of chance plays a conspicuous part." Perhaps so, but I for one would fain hold the fantastic idea that the cloud is a conscious messenger of good, and that from the time of its loading in the doldrums it is steadily bent upon reaching a given spot where its cargo may be discharged, just like the faithful ship informed by the spirit of her master, and hastening homeward with her load of food for the hungry, unthinking, and ungrateful people. True or not, the fancy is a favourite one of mine, and I believe is quite an innocent play of the imagination. Let us, then, imagine the still laden cloud in the firm embrace of a strong shoreward wind, being hurried straight to its destination. There rises before it a range of mountains which it hails as its goal. They mark the conclusion of its life work. To this end was it born; for this one purpose has it existed; and now its reward, the successful accomplishment of its mission, is at hand. Hurried onward with ever-accelerating speed, it presently reaches the serrated peaks of the mountains, and is rent asunder thereby, while its precious burden goes foaming downward into the hidden springs, from whence it will presently emerge to bless and preserve the inhabitants of the country below.

This is the mystery of the rain-cloud and the watershed from whence all the water that we must have is derived. And hence it is that I have persistently spoken of the nimbus cloud as being the most important of all the ocean's auxiliaries. Of course, it will be seen that without the aid of the wind to convey it to its destination, it would be of no avail, any more than it would have its being at all but for the beneficent sun. But it would be a long and somewhat dull process to trace the interdependence of each of the meteorological phenomena. We can only deal with them one at a time, and just hint at the way in which their influences depend upon the aid they receive from one another. Perhaps I may here again allude to the work of the nimbus as applied to India—only briefly though, because I have already, in a previous article, gone into this great question at length, and repetition, although partly unavoidable in a work of this kind to some extent, must be kept within the smallest possible limits. Still, the work of supplying the otherwise arid plains of India with their prime necessity, water, and the strikingly spectacular way in which this is effected, will excuse some repetition. The imagination dwells fondly upon the fact of those many millions of very poor people dependent upon the cultivation of the soil for their daily food, scanty and unvarying as that is, awaiting in almost breathless suspense the coming of the deliverer, the advent of the south-west monsoon, with its burden of rain-carrying clouds, from the remote and lonely ocean. In like manner, too, but without the sympathy of human interest, we can picture the cattle, the beasts

of prey, all the wild creatures turning longing eyes to the heavens, which are hard and bright as burnished steel above their heads. And under all the thirsty land, mother and provider, waits dumbly, helplessly, looking indeed as if it would never again bear green leaf or brilliant fruit.

Far out at sea, in that mysterious region remote from the ken of these waiting millions, the celestial machinery is at work, countless thousands of tons of sweet water are being drawn upwards from the exhaustless ocean, ready for conveyance eastward to where they are so sorely needed. But ready though the burden may be, it must await the means of locomotion, must tarry the coming of the south-west wind. And there that mighty mass of water hangs in the sky, black, forbidding and threatening in appearance, yet in reality laden with life for millions of human beings as well as the countless hosts of lower creation. At last the marching orders arrive, the breeze springs up, the waiting masses begin to move in orderly battalions across the vast concave of the sky. Courage, persisting ones; patience, famishing *ryot* in your distant burning fields, relief is at hand, coming faster than any human agency could provide it, for it is being borne upon the wings of the wind. And in a few hours, when the precursors of this mighty army of blessing strike the shores of the waiting land, and, with a prodigality only seen in the operations of Nature, begins to pour down its revivifying floods, there flashes from end to end of the waiting continent the glad message of life, even from the gates of the grave, "The monsoon has burst."

THE CLOUDS AND WAVES (*Continued*)

In closing the previous chapter I practically exhausted the list of all the main cloud-forms, having purposely left the work of the most important of them, the nimbus or rain-cloud, until the last. And in what I stated about its work for the Indian continent, the reader may see what it is doing on a somewhat lesser scale for all the countries of the world to which it has access. Where it cannot reach, as in the Saharan desert and the awful solitudes of Asia, the land is barren and must so remain. It would be merely monotonous to adduce instances of the rain-cloud's work in other parts of the world, because the same thing happens continually, with a few local differences due to the configuration of the land. All that remains, therefore, is to note the way in which the various forms of cloud are torn and twisted and amalgamated by the stress of the wind, or, in the absence of the wind, how they pile themselves up, sometimes until for days together they seem to interpose a solid barrier between the surface of the globe and the beauties of the clear ether above. Very wonderful and awe-inspiring is the appearance of the clouds before the commencement of the westerly gale in the North or South Atlantic Ocean, let us

say. Mighty masses of combined cumulus and nimbus clouds pile themselves up, packed closely together in the western semicircle of the sky, while the eastern half is clear, or comparatively so; but the clearness is pale, and the bright blue gradually fades away. The wind falters variably, and presently dies quite away. Then the watchful seaman will presently note a gradual lightening of the dense masses along the western horizon, growing steadily brighter and more defined until there is the beginning of an arch through which the stars, if it be night, may be seen. A little puff of wind is felt, just a suggestion of what is coming. The arch extends upwards and sideways, while the mass overhead marches forward until it occupies most of the sky while still preserving its definite outline. The wind gradually freshens until quite a stiff breeze is blowing and the appearance of the heavens is the reverse of what it was a few hours before, for now it is the eastern segment that is overcast while the western half is clear.

But this is only temporary. As the wind strengthens to a gale, only a filmy haze will overspread the western sky; and then there will appear, in rapid succession, troops of clouds of sombre hue and ragged outline, low down, and being driven in hot haste forward. The violence of the wind tears them into fragments, which combine, and again are disintegrated so rapidly that the eye can hardly follow them. And the lower portions of these tortured masses of vapour, which seem, in very truth, to be almost on a level with the sea, fly along in wisps and tufts with that tremendous rapidity which their generic name sufficiently indicates the flying "scud."

So low are they, that when the gale has become sufficiently furious to tear off the crests of the waves and whirl them upward in masses of smoky spray, there is a mingling of salt spray and fresh vapour, forming what is known to the sailor as "spindrift." So intimate is the commingling that oftentimes the sailor, aloft upon some errand of securing a loose end, finds that even at that giddy height he can taste the brine in the air. He is really breathing a mixture of cloud and spray flung upward thus high by the energy of the impetuous gale.

Of the hurricane clouds I have already spoken, that terrific combination of vapours which have been consolidated by the accumulation of electricity until the sky above seems to be scarcely less tangible than the sea beneath. And, indeed, in the height of a tropical hurricane it is not easy to say where sea and sky meet, so tremendous is the disturbance of their equilibrium, and so intimate is their association. These clouds have a character all their own, being seemingly akin to the awful gloom that hovers over the summit of a volcano which is about to belch forth fire and poison upon creation. But in their appearance only. Undoubtedly the hurricane clouds, fearful and terror-striking as is their aspect, are entirely beneficent in their effect upon the world at large. During the performance of their duties they destroy, and that upon a large scale (of course, I speak of them in conjunction with the wind); but the life that they take in the performance of their tremendous duties is infinitesimal in amount compared with the life that is saved by their aid. Perhaps, however, it is unfair to credit these clouds with so much, since

they are only an adjunct to the hurricane, which, as a whole, is such a great factor in the work of restoring the sick atmosphere to health.

And with this, I think, we must close this brief review of the clouds of the sea, which, cursory as its glance at these interesting and beautiful phenomena has been, is, I fear, quite long enough to exhaust the average reader's patience. It is a subject which has been very voluminously dealt with scientifically, and with good reason, for the clouds and their work are full of importance to life on our planet. But this is not, as I have often said, in any sense a scientific treatise, and so we must here bid farewell to the clouds, and, descending again to the ocean itself, devote a little space to a consideration of the waves.

Of late years the phenomena of waves have been considered by scientific observers with the utmost care, but their scrutiny has by no means been confined to the waves of the sea; indeed, these interesting movements of the water surface are the least important among waves. Sound waves, light waves, heat waves, ether waves, afford a wonderful field for speculation and minute research, and the result of this research has been some of the most interesting, useful, and beautiful discoveries of our time. But our only concern at present is with the waves of the sea, which, like the clouds, have long been beloved by the poet and the painter for their wonderful beauty of form and colour. Nor have we to consider what are popularly known as tidal waves, because we are about to deal with them in the chapter on Tides. We have to deal with the waves whose causes are the winds, and whose size and force and appearance are directly in proportion

to the influence exerted by the wind upon the surface of the ocean. It is a curious fact that even the fiercest of conflicting currents, unaided by the wind, is unable to produce more than a series of eddies, certainly nothing important enough to consider as waves; but even a moderate breeze blowing across the set of a fairly strong current will suffice to raise what sailors significantly call an "ugly" sea, meaning one that does not run truly or regularly, and is therefore dangerous.

Before going any farther, however, it will be well to point out in this connection the nautical use of the word "sea." The sailor scarcely ever uses the word "wave;" why, I do not know. Instead of saying that a heavy succession of waves were running up from the sou'-west, he says that a heavy sou'-west sea was running. He never says the waves were high or breaking, but that the sea was high or breaking, the ship taking heavy seas aboard, strong wind and following sea, and so on. Therefore if in what follows I drop into the vernacular and use the word "sea" in its nautical sense, I hope it will not be misunderstood.

I suppose that everybody knows that the cause of all ordinary waves is the pressure of the wind diagonally along the surface of the water. When there is no wind the sea surface is smooth and glassy, but always more or less undulatory, as if with the gentle heaving of some gigantic breathings far beneath. This is called the swell, sometimes in the calm following or preceding a heavy gale forming huge knolls of mirror-like water, and causing a vessel to roll or pitch heavily, and sometimes so slight as to be hardly perceptible, unless an attempt be made to steady a

ball upon the smooth surface of a table on shipboard, when the effect of the swell is at once evident. For this reason there is a large amount of poetic licence in the verse of the old ballad—

> "No stir in the air, no swell on the sea,
> The ship was as still as ship might be;
> Her sails from heaven received no motion,
> Her keel was steady in the ocean."

When the wind rises there is at once to be seen a series of tiny ripples like irregular furrows along the hitherto smooth surface, infant waves that under the glowing sunlight look wonderfully pretty. The wind increases, and with it the size of the wavelets, which presently fling from their miniature crests little feathers of sparkling spray that glisten like showers of diamonds in the sunshine, producing the many-dimpled smile of ocean spoken of by the Greek poet. Very curious and interesting, too, is the behaviour of these wavelets when the wind is uncertain in its direction and irregular in its force. They rise and fall confusedly, showing on a small scale the movements of the broken and irregular sea caused by a shift of wind in a gale, or the wind blowing across a strongly-running current, as mentioned a little while back. If, however, the wind is steady in direction and increasing in force, the ridges of water rise higher and the spaces between them grow wider, until at the height of the gale in the open ocean the sight is terribly grand, and so impressive that the greatly exaggerated expressions, "seas running mountains high" and "mountainous seas," have been and are still used to denote the presence of waves whose maximum measured height from the sea surface has

never been known to exceed sixty feet. Of course, if to this be added the depth of the trough or furrow between each wave below the sea surface, we shall get a few feet more in actual altitude of the wave, but not much. Still, to the mariner on board a deeply-laden ship, whose freeboard or height from the water-line to the deck is only about six feet, or even less, these seas are quite sufficiently mountainous to cause many apprehensions as to the ability of his ship to survive their assaults.

There are few sights at sea more appalling when in a weak ship, on the long stretch between the great Southern Capes, for instance, during a westerly gale, than the way in which the gigantic waves, reaching from horizon to horizon and towering high above the cowering ship, come thundering up unceasingly after her, as if they were bent upon her destruction. Their energy seems so resistless, their perseverance so unfailing, and their magnitude so terribly overpowering, that it needs all a man's confidence in the seaworthy qualities of his ship to keep him from becoming afraid. Then the speed of these mighty waves is so great—that is, their apparent speed. For here comes the most difficult point of all. Looking at the waves as they come thundering on, you are compelled to believe what seems to be the evidence of your senses, viz. that the whole of the ocean surface is rushing towards and past you at the rate of about twenty knots an hour. Yet the fact is, of course, as a little quiet consideration will show, that it must be that the movement is as purely undulatory and non-progressive as is the tightly stretched surface of a sheet when the point of a stick is pressed against

it, and rapidly pushed along it withal. There are a series of waves on the surface of the sheet, but the fibres of the material do not progress. The simile is correct enough; but oh! so feeble. For who on beholding the majestic rush of the storm-wave, even though he notes the breaking of its huge snowy crest and the curdling stationary mass of foam where it passed, can help believing against his better judgment that the whole mass of water is hurrying on and about to overwhelm him? Moreover, the deadly fact remains, that if the ship be not travelling at a sufficient rate of speed the waves *will* overtake her, will break on board instead of harmlessly astern, and deal death and destruction all around them. As long as the ship can "give" before the sea she is safe, but if she lies sluggishly in its path she must be destroyed, unless she be as powerfully built as a modern ironclad, one of which I have seen with clean-swept decks braving the impact of mighty Atlantic seas with apparently as little prospect of damage as if she were a rock deep rooted in the bowels of the earth. Until then I had thought that nothing could withstand the shock of a full-powered ocean wave, but now I have my doubts. I know, of course, the feats performed upon breakwaters in course of construction, of the lifting of immense masses of stone many tons in weight from their resting-place below low-water mark, and hurling them over the top of a pier; but then, of course, a ship, be she ever so massive, is not a structure built into the solid earth; she must have a certain amount of "give" about her.

But even then there are innumerable instances where the vessel has not given quite soon enough, or

quite in the right way. Then she has received the terrific impact of the wave, and although ever so powerfully built and immune from damage as to her solid structure, she has emerged from the immense turmoil of water swept clean of everything in the nature of upper works and fittings, let them be ever so well secured.

As an instance of the amazing frictional power of the sea, as well as its mighty impact, let me quote an experience of my own. I was on board a fine passenger sailing ship, in which we had run from England in the wonderfully short space of eighty days, during the last fortnight of which we had been flying at fully sixteen miles an hour before a tremendous westerly gale and a corresponding sea. But with staunchness of ship and fine seamanship we had not suffered the loss of a rope yarn, as sailors say, until one night off the southern point of New Zealand, the Snares, having run far enough, it was necessary for us to heave-to. Now, this operation is always a difficult and dangerous one in a gale with a heavy sea, demanding the greatest skill and coolness on the part of the commander, which requisite in our case was fully satisfied. All was made ready, and at the propitious moment the ship was brought to the wind, turning quickly and easily past the danger-point when the giant sea rolls squarely on the broadside. But just as she came up into the wind, the biggest wave I have ever seen towered up over the weather-bow like a vast black wall, and, at a yell from the bo'sn, everybody clutched at some holding-place and held his breath. Down came the wave on the topgallant forecastle, and rushed aft along the decks, where its impact stove in

the massive front of the saloon, which apartment it gutted. That was not to be wondered at, any more than was the loss of the bulwarks and everything movable, however firmly it was lashed. What was passing strange was the fact that all the teak-panelling on the sides of the forward-house was smoothed off as by a gigantic plane.

What the force of the waves when meeting with a rock-barrier means, has, as far as I know, never been assessed in terms of foot-tons, nor do I know that the statement if it were made would be intelligible or even interesting to most of us. But it is one of the grandest sights imaginable to witness, during a gale which is blowing directly on shore, the impact of the waves against such a tremendous cliff rising sheer from the sea as is the North Head of Sydney, New South Wales, for instance. As the mighty Pacific waves, with the accumulated force behind them of the immeasurable storm, strike against that sheer wall of rock, the whole surrounding land is felt to tremble and quiver, and four hundred feet above there rises from the turf crowning the cliff great fountains of spray, forced upward through the interstices of the rock by the weight of the waves. But more terrific in appearance is the aspect of the waves when suddenly arrested in their majestic onward rush by a submerged reef. Then the wave, meeting the obstruction in its most massive part, and meeting it, too, so abruptly, rises in a vast wall of roaring foam, and hurls itself over the barrier as if it must find something to destroy. But in spite of the magnitude of the breakers and the fierceness of their onset, their power is broken only a few feet inside the reef, and all is peace. The wild waves of the sea are curbed,

and naught remains of them but hissing foam, which the exultant gale snatches up and scatters in minute spray many miles inland, or shreds into spindrift over the sea beyond.

Immense and awe-inspiring, however, as are the regular waves of the great ocean, and dangerous as they must always be to vessels that are weak or badly handled, they are, by reason of their regularity, far less dangerous, generally speaking, than much smaller seas which are irregular and less to be depended upon, as, for instance, in such restricted waters as those of the English Channel and North Sea, where a series of true waves can never be found, owing to the conflicting currents of comparatively high velocity, which will not permit the waves to run regularly. When this is the case, the strain upon a vessel is much increased, since the impact of the waves upon her does not admit of her being handled so as to receive it in the best way for her to resist. It is to a sailor an almost pathetic sight to see a good ship struggling against not one, but a host of enemies; not able to face an organized opposition for which she may make preparation, but subject to the all-round attacks of a disorderly mob, each member of which, though acting independently, has apparently the same end in view, destruction. No doubt the high, conflicting, and dangerous seas raised by the opposing action of winds and currents have been responsible for the fables told among the imaginative ancients of whirlpools, such as the Maëlstrom, which were popularly supposed to draw ships down into the bowels of the earth and eject them, sometimes entire, but more frequently in fragments some distance away. Remembering the

size of those craft and their utterly inadequate protection against the attack of seas which sufficiently test splendidly marine structures of our day, we cannot wonder that such stories were firmly believed in. There can, indeed, be very little doubt but that those tiny craft were often overwhelmed by the furious broken seas in such a manner that they disappeared from view, and only reappeared at some distant spot, generally in pieces. What wonder, then, that they were credited with having made a long journey through vast caverns at the bottom of the sea!

Such dangerous congeries of waves are not, unhappily, confined to narrow waters; but where the great ocean currents, such as the Gulf Stream or the Agulhas current, glide along and are met or crossed by a gale, the tumult of the distracted waves is fearful to behold. There are few sailors experienced in Southern Seas who would not prefer to meet the mighty but regular waves off Cape Horn rather than the shorter, less lofty, but erratic seas of the Cape of Good Hope. And that for the reason already given, the impossibility of placing the ship so that she shall receive every wave where she is best fitted to bear its blow. Let me explain. Ships are built to breast the waves with their bows, so that, whether they are driving into the sea, or the sea is rushing on to them, the result is the same, the bows rise to the sea. If, however, the ship does not run away from a following sea fast enough, when it overtakes her, instead of raising her stern, as it would her bow, it depresses the after-end of her, rushes on board, and does damage proportioned to its weight. The same thing happens, of course, when a vessel tries to go or is driven by the wind astern against a heavy sea.

In the case of a steamer such a thing would never be tried. If it were found that she could not keep ahead of the sea because not able to go fast enough, she would be turned round (watching a favourable moment when the sea was running less high than usual), and then, keeping the engines going slowly, she would be steered head on to the sea and ride in comparative safety, if not comfort. A sailing vessel, on the other hand, can never be held as closely head to wind except by a cumbrous contrivance known as a sea-anchor, and never resorted to but in cases of direst necessity, because of the immense difficulty of handling it with the scanty number of men carried.

Now it will, I think, be seen by the foregoing that if the sea does not run true, these seamanlike preparations will be of little avail, because the seaman can never tell where his vessel is going to be assailed next. The use of oil, however, has been and is of wonderful service in smoothing an angry sea, and much damage has often been avoided by having canvas bags of oil trailing over the side, thus keeping a smooth area, a sort of charmed circle around the ship, outside of which the waves may rage like angry demons, but they cannot pass it to do their destructive work. Unfortunately, the ships that need this safeguard most are those which, from motives of economy, are less likely to be thus provided.

There is another form of irregular sea which is not produced by the wind blowing across or in opposition to the current. And this may arise anywhere. It happens that when a gale has been blowing sufficiently long in any given direction to raise a heavy sea, and then suddenly dies away, leaving the waves still

running heavily in the same direction. A fresh gale springs up, and blows with violence from a totally different quarter, raising a new series of waves in conflict with the old ones, and producing a most harassing, disturbing, and dangerous condition of affairs. Sometimes this will happen in a part of the sea where there is a current running, which adds to the trouble of the waters, and then the state of matters is very bad. Such an experience I once had off the Cape of Good Hope. We had been struggling for some time with a gale which was blowing diagonally across the set of the current, raising an exceedingly ugly sea, and making the vessel, which was heavily laden with coal, bound to Bombay, wallow in the midst of the waves, as if she were a half-tide rock, over which the sea foamed incessantly. The gale died away very rapidly, and sail was made in order to get away from this stormy locality. The wind dropped to a calm, while the vessel kept tumbling about like a drunken man; then suddenly the wind sprang upon us from the opposite quarter, like a lion from his lair, catching us aback and driving us stern foremost into the seething, uncertain welter of waves. For two or three hours the fate of the vessel and all hands trembled in the balance. The waves just tumbled on board of us where they listed, and several immense masses pooped us, *i.e.* came on board over the stern. We were so short-handed that we could not get the sails handed quickly enough, but fortunately they were old, and they blew away. At last, when all hope seemed to be gone, we got the vessel under control, and laid-to as nearly head to wind as possible, and the wearied crew were enabled to turn their attention to the pumps, there

being a little matter of five feet of water in the hold.

But of all the exhibitions of waves the ocean can afford, there is none that can compare with that of the hurricane centre, except, of course, the utterly abnormal earthquake wave, which is a cosmic phenomenon for which earth and not ocean is responsible. In the height of a tropical hurricane the wind blows with such fury that the sea cannot rise, hard though it may seem to believe. Of course, if the wind were to blow hard in one steady direction for any length of time, doubtless the waves would rise to an abnormal height, running true; but, as I have before pointed out, in a hurricane the wind blows round a given centre, and a stationary object is therefore continually changing its direction. No words can give the most meagre idea of the force with which this terrible circling wind is driving around its axis; even if experienced, the mind retains but the faintest impression, quite uncommunicable by words, of its power. But about the centre of this vast area of tempest there is a spot of only a few miles in diameter, a sort of funnel in the atmosphere, as it were, wherein there is practically no wind, the opposing masses of air in motion having neutralized each other's force. Within this calm area the waves, held down by the enormous pressure of the wind without it, find themselves suddenly freed from restraint, free to exert their power. So they rush into it at mad speed from every direction, and, meeting, hurl themselves about in vast broken masses as if the ocean had run mad. The surface of a fiercely boiling pot filled with water, magnified ten thousand times, will give a faint resemblance to this amazing spectacle,

which, however, is seldom viewed by man, for two reasons: first, that few ships can live through it, and, secondly, that it is dark with a darkness that can be felt. Moreover, at such a time the human heart is oppressed with a sense of its own utter insignificance in the scale of things, and rather wishes for a hiding-place—craves for oblivion. Yet I think the simile holds good of boiling, only it is the boiling of ocean, with apparently all the subterranean fires expanding their energies beneath.

Of the waves consequent upon submarine upheavals, and resulting in a higher elevation of masses of water above the ocean level than is otherwise possible, I am to speak presently in the chapter on Tides, and with these we may also class massive progressions of the ocean surface, that are commonly, but probably erroneously, spoken of as tidal waves. Also of the purely local and incidental disturbances occasioned by the calving of an iceberg, the sudden breaking off of millions of tons of ice in one mass from the protruding end of a glacier, like the launching of some unimaginably huge ship without any restraint into deep water. But these are of such infrequent occurrence, compared with the everyday wave and swell of the ocean, which are a part of its daily life, as not to deserve more than passing mention, although to the privileged beholder they come with a sense of great awe, and conduce to reverence for the mighty works of Nature.

In conclusion, it may not be out of place to point out that, immense as are the manifestations of energy put forth by all the waves that have been mentioned, only a few fathoms beneath them the darksome deep

lieth in profoundest peace. Motion there is, certainly. As the late Admiral Wharton once finely said, "Of all the myriad tons of water of which the ocean is composed, not one drop is ever at rest;" but it is gentle, hardly perceptible, a circulation of the waters to which the mobility of the air is furious activity. But of all the multitudinous causes which go to maintain the beneficent circulation upon which the health of the world depends, none is more important than that of the waves of the surface of the great and wide sea.

OCEAN CURRENTS

Of all the means whereby the mighty ocean, regarding it as a whole, exercises its beneficent influence upon the earth, none are more potent in their power, more wide-reaching in their effects, or more interesting to study than those enormous movements of incalculable masses of water which we call "currents" and "tides." Now, at the outset of what must be, in the nature of things, but a cursory glance at these immense oceanic phenomena, it is entirely necessary to point out the difference between current and tide. As briefly and roughly as possible, a current is like the movement of a stream which has a slight alteration in its level from its source to its mouth. It runs in the one direction because water cannot run uphill, it runs faster or slower according to the quantity of rain that falls, and sometimes, when the rainfall has been excessive, it overflows its banks and makes a series of temporary currents wandering over the adjacen country, their direction being determined entirely by the variations in the contour of the land. But, in general, the direction of such a stream is quite permanent, owing to the physical confinement of its banks, and therein it differs much from an ocean current. The parallel is, however, sufficiently near for our present purpose.

Tide, on the other hand, resembles the course of a body of water that is regulated mechanically, as by pumping, and is regularly propelled in one direction for a certain number of hours per day, and in the opposite for another similar period, independent of any considerations of weather, rainfall, etc. Here, again, the simile is weak and halting, but it must serve as giving a slight idea of the difference between tide and current.

Now, as regards the permanent character of oceanic currents in speed and direction, there is very much to be said. Indeed, it would appear as if, at the outset, we must admit that no ocean current is permanent in the particular sense with which that word is used. In a general sense, the great oceanic currents are permanent, that is, they run continually in the same general direction and at the same general rate, only varying either under some great atmospheric or submarine disturbance. Now, when we say the great oceanic currents, we mean the Gulf Stream and equatorial current in the Atlantic, the Kuro Siwo or Japanese current and equatorial current in the Pacific, these Atlantic and Pacific currents being curiously alike, allowing for the different configuration of the land and magnitude of the two oceans. The Mozambique current in the Indian Ocean and Humboldt's current in the South Pacific complete the list of the great oceanic currents that have received specific names.

It has, however, been considered that all the great currents of the ocean commence within the tropics, and that their primary cause is the enormous amount of evaporation that is continually going on under the

fierce heat of the sun. It has been estimated that in the tropical Atlantic alone the amount of water raised annually would represent a cube of nearly thirty miles in extent, or about 120 trillions of cubic yards. Of course, an immense amount of this *fresh* water falls back again into the ocean from whence it has been raised, but the bulk of it is carried into seas beyond the tropics and over the adjacent lands. Now, to fill the great void thus caused, the colder and heavier waters of the Arctic and Antarctic regions continually flow in because they are continually being augmented by rain and melted ice. In their motion towards the equator they are assisted by the Trade Winds from the north-east in the Northern hemisphere and the south-east in the Southern hemisphere, and thus they heap up the tropical warm water about the equator. To escape to its level, which of course all water must do, this immense volume of warm water, pressed on either side by the heavier cold banks of water, takes the line of least resistance, which is directly westward. Two main causes decide this: first, the movement of the earth upon its axis from west to east, and secondly, the easterly winds on both sides of it. There is another adjunct which we will come to directly, but at present it is sufficient to indicate the two main forces.

Now, this mighty body of water, twelve or fifteen hundred miles wide, flows steadily westward, slowly, it is true, but with a quite perceptible rate of from six to twenty-five miles a day, according to the season. It enters the Gulf of Mexico, washing the shores of the Antilles, but in no wise hindered by them. It flows majestically westwards into the Gulf,

its progress being accelerated as its channel is narrowed, not now by the cold banks of water on either side of it, but by the barrier of Cuba on the north and the mainland of Central America, the peninsula of Yucatan on the south. Presently it meets with an impassable barrier, the continent of America, staying its further westward course, and, driven by the irresistible thrust of the great body of water behind it, takes the only road possible, that is, it turns first northward, then eastward, returning along the northern shores of the Gulf with ever-increasing speed. And now the Gulf Stream is in being. Out of the narrow Florida Channel pour the superheated waters, struggling to make their escape from the pressure behind. In the Bahama Channel, cramped into the breadth of less than fifty miles, they sometimes attain a speed of one hundred and ten miles per day, gaining their impetus for their long journey across the Atlantic.

It is time to drop the plural and speak of the Gulf Stream as an entity, and one that has probably had a greater influence upon the history of the world than that of any other of the physical phenomena with which we are acquainted. Immediately upon emerging into the open Atlantic it spreads out and slackens its speed. Practically following the contour of the North American coast, but kept well off the shore by the cold stream pouring southward from the Arctic, it flows on ever northward and eastward withal, until, happily for us, it is met by the full force of the icy current flowing south from Davis Straits, and deflected so that its main body points almost directly to these favoured islands. It is a veritable river in the sea, a river of warm water whose

bed and banks are of cold water, and it is to this fact that we owe our national existence; for if, instead of flowing as it does over a bed and between banks of cold water, it flowed over a shallow bottom of earth, it would lose its heat so rapidly (earth being a far better conductor of heat than water) that by the time it reached our shores it would have none to give us, and the conditions obtaining in Labrador and Greenland would be ours. The Thames, the Severn, and the Clyde would become glaciers, and all that Britain stands for would be annulled. Of course, the same thing would happen if, by any cataclysm, the course of the Gulf Stream could be changed —deflected south, let us say—so that it would recurve to the westward about the Azores.

But, it may be asked, how is it that this great oceanic river of water pursues its way over so many miles of intervening sea without losing either its direction or its distinctive characteristic? Why does it apparently obey a different law to that which makes the equatorial current flow westward? Has the rotation of the earth upon its axis no influence upon this eastward-flowing stream? Remembering that this is not a scientific treatise, but an attempt to treat the great question of ocean circulation in a way that shall be popular yet not misleading, I would remind the reader, first of all, that cold water is heavier than warm, and consequently when a body of cold water strikes a body of warm water it does not, as we might think, amalgamate at once, but the cold water sinks as well as pushes the warm water back. But if the body of warm water has a vastly greater bulk than the cold, it will not be pushed back, but will continue

its flow in whatever direction it is going, without parting with nearly so much of its heat or spreading out as it would have done if it had met with water of only a degree or two lower temperature than itself. Another reason why that great body of warm water should pursue its easterly course in defiance, apparently, of the earth's revolution is, that in temperate latitudes the prevailing winds are from west to east, and the warm water being always on the surface is helped along eastward very greatly by this means. Another complication appears in the fact that salt water is heavier than the fresh, and it would seem as if the extra weight of the warm water of the tropics, where so much evaporation has taken place that the salinity thereby is greatly increased, would quite compensate for the increased specific gravity of the cold water, remembering how much fresher the water from the Arctic must be, ice and rain and little evaporation all tending to reduce its salinity.

But these complex factors balance one another in such a way that the great Gulf Stream flows majestically on towards us, widening out as it gets eastward until about the Azores it divides. One branch of it recurves to the southward to join the parent stream, and the other trends northward, raising the temperature not only over these islands of ours, but actually reaching up into the Arctic seas, and modifying the rigours of their stern climate. But it is with its effect upon us in Britain that we are concerned. It cannot be too strongly insisted upon that but for the Gulf Stream Britain would be an ice-bound desert. In a never-ceasing stream of beneficence this vast oceanic river flows on its unceasing journey, making these

islands blossom like the rose because of the tropical warmth it bears to us across the ocean. Of course, as I hinted a little while back, this current, although fairly entitled to be called permanent, is subject to many disturbances fraught with great discomfort to us here in Britain. For instance, a long-continued spell of north-easterly winds will hinder its coming east, and consequently reduce us all to such a condition of mind and body that we are inclined to ask despairingly, "Is life worth living?" An increase in the number of icebergs calved from the great northern glaciers, and borne south by the current already alluded to, will bear into our friendly warm current such a mass of congealed water that its temperature will fall rapidly, and we ask ourselves, without any hope of a favourable answer, Where is the summer? What is happening to the poor old world? And some of us go so far as to blame the spots on the sun, or, rather, the rents in his envelope of incandescent gas, for what, if we looked nearer home, we should find ample reason. But these experiences exemplify in a most striking degree how dependent we are in this our homeland on the regular performance of its functions by the ocean for the right to live. It is only another instance of how entirely dependent the British Empire is upon the sea for its existence. Take it whichever way we will, we live by favour of the sea, and that being so, I am always in a chronic state of astonishment that the chief place in our school curriculum is not given to a consideration of all that the sea means to us. Unhappily the fact remains, that with a reputation for practicality exceeding that of any other nation, I have the greatest possible doubt whether we are not

the most unpractical nation on earth. We spend more, far more, upon utterly useless forms of so-called sport every year than would suffice to find funds for dozens of technical colleges for the teaching of things that really matter to us.

Believe me, I am not carping at sport or play, for I know their value, but I do hate to see several thousands of men gathered to witness the performances of a few gladiators—no, footballers, or cricketers, or racehorses—each paying dearly in time and money for his place, and each hoping to recoup himself for his outlay by a successful bet. It spells decadence of the worst kind. I listened the other morning to a group of newsboys at King's Cross station discussing the prospects of various cricketers this season. They were all versed to the last detail in the exploits of the men they were discussing. Their memories were wonderful. And then I took the brightest, as I thought, of them aside, and asked him how many counties were included in the administrative county of London; and he said, with a resentful note in his voice, "I don't know what you're talking about!"

A journey round the saloon bars of London on any evening of the year, and a quiet listening to the conversation, will elicit the astounding fact that the chief interest of the manhood of England is vicarious sport, always with the underlying prospect of winning somebody's money without working for it. Occasionally a question of politics arises; but if so, it means a row, because nobody knows anything really about the matter. Such pitifully garbled opinions as they have (for which most of them are ready to fight) they have taken from the columns of their evening paper after

they have devoured every item of so-called sport chronicled therein. Their ideas of the great national issues at stake, irrespective of party, are beyond all question lamentably, pitifully feeble and ignorant, and that, not because they lack any of those intellectual attributes that men should have, but because they have deliberately chosen to stultify their intelligence by turning it to things that do not matter.

One word more on this extraneous matter and I have done. We are almost at a crisis in our national career—I am not sure that we are not really there—yet we still find in our great newspapers—leaders and formers of public opinion—that there are not merely columns but pages on golf and bridge and racing, cricket and football, of which it is safe to say that not one word is calculated to be of the slightest benefit to any human being, but rather that it all tends to a complete national degradation.

To return to my subject, without any apologies for the digression, the place of honour having been given to the Gulf Stream, as of right, there does not remain a great deal to be said about other great currents of the world; at least, not in an article like this. For one reason, the main causes of these great currents are the same, but none of them have the same far-reaching effects upon mankind. And this has held true since the dawn of European transoceanic navigation. The old Vikings who discovered America centuries before Columbus did so by making almost a coasting voyage of it from Norway to Shetland or Faroe, thence across to Iceland, then to Greenland, then to Labrador, and so south to Markland, which was probably on the coast of Maine or Massachusetts. And from a consideration

of the set of sub-arctic currents as we know them, it does not appear that they, the Vikings, owed any of their success in getting to the westward to current at all, since all along the route they must have taken the streams are feeble and irregular. But one thing appears certain about the epoch-making voyage of Columbus, and that is that either he or his pilot decided upon going south first before launching out westward, and thus they got into both the equatorial current and the North-East Trade Winds, making their arrival in the West Indies a certainty at some time or other, whether they made any calculations or not.

In like manner the return passage was made easy by their discovery of the Gulf Stream and its accompanying westerly winds, which did the same kind of office for their feeble little ships as the Trades and line currents had done when they were outward bound. It was, however, fortunate for them that they did not sail into the great Atlantic eddy which lies between the eastward and westward streams, a place of comparative stagnation, which was early discovered by the Spaniards, and received the name of the Sargasso Sea. Hither comes all the flotsam of the middle Atlantic eventually, unless arrested by some shore or another, and once having arrived, here it remains. Very few seamen have penetrated to the centre of this eddy, for even on its outskirts the masses of weed, the floating fucus of the Atlantic, which has been called the Gulf Weed, are often so closely packed together as to hinder a vessel's progress. A glance at a good atlas, which has a map of the commercial routes of the world combined with the ocean currents, would seem to contradict this statement; but the

smallness of the scale upon which these maps are drawn, and the really great distances between many tracks that appear to lie closely together, must always be taken into consideration.

It must be remembered that although in this great eddy the water has scarcely any lateral movement, yet the change of specific gravity, owing to evaporation, causes a constant vertical movement of the waters, so that, as the late Hydrographer to the Admiralty almost poetically put it, "not one drop of the ocean is ever quite at rest." And this is an absolute necessity, for so vast a body of water becoming stagnant even for a very short time would of necessity develop very dangerous conditions to the peoples of the earth. I have myself seen the ocean in one of those great eddies during a long-continued calm appear to become stagnant, and it was an awe-inspiring sight. Fortunately, such a condition of things always rights itself sooner or later atmospherically by a hurricane, which, while dealing destruction to any handiwork of man which it meets upon its terrible path, is in the highest degree beneficial to the hemisphere generally in which it occurs.

In the South Atlantic the great equatorial current is driven by the northward rush of the cold water of the Antarctic to join the main body pressing westward to augment the Gulf Stream. But in this great ocean there is also an eddy in the centre thereof extending over many thousands of square miles of one of the least frequented seas in the world, for this space offers no inducement to the mariner to enter therein, even those handling sailing ships. The outward bounders avoid it on the west, the homeward bounders

on the east, and as there is no direct trade between the south-west coast of Africa and the south-east coast of America, this great space remains unvisited by steamships either, being left as lonely as the Antarctic. The vast current of this latter great ocean, while ever tending northward, as might be expected, to fill up with its heavier cold water the immense space left by evaporation, as before noted of the North Atlantic, has another mighty force acting upon it, which virtually transforms it into a world-engirdling stream, eternally sweeping on its majestic path round the globe.

Here, as nowhere else in the world, is it possible to circumnavigate the globe on a given parallel of latitude without ever sighting land, except perhaps one or two lonely islands. And as it is equally the case in the southern as in the northern hemisphere, that in extra-tropical regions over the sea the prevailing winds are westerly, so it will at once be seen how in this wide ocean space the whole body of water must be ever kept marching round the world. Of course where possible it must trend to the northward, owing to its superior specific gravity, as, for instance, where striking the Cape of Good Hope it sweeps northward along the West African coast as far as the equator, being there known as the Benguela current. In the same way it strikes the great peninsula of South America, and sweeps up its western coast until it reaches the equatorial currents. It is there known as Humboldt's current. In like manner it breaks against the great Australian island at Cape Leeuwin, and flows northward to form the West Australian current, and incidentally assists in the forming of

the complicated circulation of the Indian Ocean. It is not without good reason that I call the current system of the Indian Ocean, with its two great offshoots, the Arabian Sea and the Bay of Bengal, complicated. True, there are complexities in the Atlantic circulation, but they are simplicity itself as compared with those of the Indian Ocean, for here, while there is a vast cold stream bounding its southern verge and thrusting a chilly flood northward along the torrid West Australian coast, there is no corresponding force being exerted on the northern boundary, as in the Atlantic and Pacific Oceans. The East Indian archipelago effectually hinders any interference from the great equatorial stream of the Pacific Ocean, and so, bounded by heated land on every side but one, the Indian Ocean has had to develop a circulation peculiarly its own, and not in the least like that of the other oceans.

Again, in developing this singular circulation the factors have been unusually complex. The evaporation, of course, is enormous, and invites the cold water of the Antarctic current to rush in and fill the vacancy; but there is also the curious atmospheric phenomenon of the north-east monsoon blowing for about six months of the year, and followed by the south-west monsoon. Here let me interpolate what I feel to be a necessary warning, having found so many otherwise well-informed people astray upon the point. The title "monsoon" is derived from the Persian word *mousum*, signifying season. (The orthography being phonetic is doubtful.) It does not mean a necessarily stormy wind, but a seasonal wind, and to confound it with a hurricane, a cyclone, or a typhoon is quite

wrong. These seasonal winds have, of course, a great effect upon the circulation of this enclosed ocean, but owing to the great wedge of Hindostan being thrust down between the Arabian Sea and the Bay of Bengal, they exert it in erratic fashion. In the south part of the Indian Ocean, the South-East Trade blows with fair regularity, but its limits are much circumscribed as compared with their extent in the other oceans, and in consequence its influence upon the currents is very much less. Moreover, the Southern Indian Ocean has the ominous notoriety of being more subject to hurricanes or cyclones than any other part of the world, and when these truly terrible atmospheric disturbances occur, they exert so mighty a force upon the ocean's surface that they upset the regular current circulation for a long time.

But in spite of all the perplexity of the Indian Ocean currents, the general trend of them culminates in a steady stream, which, sweeping southward between Madagascar and the African mainland, rushes right round the Cape of Good Hope until met by the great Antarctic drift again, and being forced backwards, recurves and runs parallel with the barrier of cold water to the eastward. It is of incalculable service to the sailing ships homeward bound from India, who keep close enough in to the African land to avoid the counter current, and are thus carried round the Cape of Storms, no matter what the direction of the wind may be. It is here known as the Agulhas current, and under this name is held in affectionate remembrance by many an old sailor for its invaluable assistance to him in getting round the Cape and into fine weather on the other side of that grim promontory.

In the Pacific Ocean we have, on a very much larger scale, of course, a similar circulation to that of the Atlantic. Only here, between the north and south equatorial currents, just north of the equator, we have a counter warm-water current running west, into the causes and effects of which we need not stay to inquire, although they are fraught with incalculable consequences of good to the peoples of Asia and America. The great fact emerges, that the main body of the equatorial current flowing west and meeting with the mighty barrier of the East Indian archipelago recurves, as does the Gulf Stream in the Atlantic, but not in nearly the same energetic fashion, seeing that the geographical conditions are much less favourable to its doing so. But it sweeps northward along the eastern shores of the Japanese islands until catching the prevailing westerly wind, and prevented from running north by the great chain of the Aleutian Islands, it pursues a steady course across the wide Pacific until it strikes the shores of British North America, which it thus preserves from being an icy desert, being, like its counterpart in the Atlantic, composed of warm water. But it is not so warm as the Gulf Stream, not having had the same opportunities of gaining heat, and also being more superficial; nor is it so energetic, dwindling sometimes in its rate of progress eastward so much that it has to be classed as variable.

It is, however, fairly certain that by means of this current early Chinese or Japanese navigators, not intentionally but perforce, reached America. At any rate, many scientific investigators have given it as their opinion that the land of Fusang, mentioned

in Chinese annals as having been discovered by them several thousands of years ago, was a portion of Central America. This brings us to a brief consideration of the great part played by the main oceanic currents in the colonization of the world; not perhaps in the modern sense of colonization, but as accounting for the obvious relationship between the inhabitants of lands widely separated by ocean. This relationship is, of course, too large a subject to do more than mention here, and yet I feel I must allude to one striking instance which came under my own notice. During my cruise in Polynesia I gained a superficial knowledge of some of the dialects, but principally of the Tongan. At any rate, I learned to count up to ten—ta'ha, ooa, tolu, fah, leema, ona, feetu, valoo, eva, cow-ongafulu (I spell as I remember, phonetically). Several years after I was in Madagascar, at Tamatave, and we employed on board a number of Betsimasaraka, the aborigines of the islands, the Hovas being obviously the ruling race of Malay conquerors, and having no likeness to the real autochthones. One day I heard a native counting, and to my intense amazement his numbers were almost identically the same as in Tongan. I asked the Rev. George Shaw, who was then the L.M.S. Missionary at Tamatave, if he could explain it, knowing that he had been in Polynesia; but although he gave me a very learned lecture upon the interchange of races, I regret to say that I have not retained any of it, except the profound conviction that in some way, unexplainable now, but certainly owing to the set of the currents of the ocean-drifting canoes with men in them from one island to another, the similarity

of language between lands so widely separated was brought about.

Only upon this hypothesis can the gigantic monolithic statues in the small Easter Island be accounted for. There they stand or lie upon their vast rock platform, a mystery and marvel to all, but to none a greater mystery than to the present inhabitants, who are as incapable of such work as toddling babes would be, and whose history, handed down orally from generation to generation, bears no record of such mighty work being carried out. It is beyond question that, borne by the current from some highly civilized land (as civilization was then understood), some wanderers landed on Easter Island, and there followed their bent towards perpetuating their worship by erecting these extraordinary monuments. And the same thing, in varying degrees, may be found in many other islands of the South Pacific, as well as in lands widely separated by sea, but obviously closely related by tradition.

So far we have been considering the great oceanic currents which are fairly settled in their course and direction, varying, of course, according to season, and disturbed by occasional hurricanes, but maintaining their steady flow. But besides these, there are the countless unknown currents, the great submarine movements of the ocean, whose force and direction we can only conjecture from a knowledge of the conditions likely to produce them, and in consequence of those conditions fairly steady in their incidence. Then come the occasional currents, which give more trouble and searching of heart to the navigator than any other phrase of his calling, for the mobile mass

of the ocean is susceptible not only of surface suasion, such as is exerted by a long-continued gale, diverted or retarding or accelerating an immense and well-known current, but it may be, and often is, affected by submarine disturbances, such as earthquakes or volcanoes, of whose occurrence the mariner can have no knowledge.

It has already been pointed out that warm water is lighter than cold, and that consequently a sudden change of temperature in the bed of the ocean must cause a corresponding displacement of a large body of water, in other words, set up a new and temporary current. This being borne in mind, it will be readily understood how, if by some great opening in the sea-bed admitting the cold water into an incandescent abyss and thereby suddenly raising the temperature of the lower stratum of water many degrees, the whole body of water for hundreds of miles around may be driven or drawn in a totally different direction from the normal. These immense changes are continually taking place in some part of the watery world, but, in the nature of things, they must be unknown to the sailor, and, let him be as careful as he will, they will occasionally land him in some disaster, for which he will be held to blame, but which he was powerless to foresee and consequently to prevent.

Fortunately for the world, such changes, immense as they are, have but a comparatively trifling effect upon the great regular currents of the globe. The ocean areas are so enormous that, although such a catastrophe as I have mentioned may temporarily affect an area of many thousand square miles, that effect will still be but local and last but a short time.

The normal conditions of cold and heat and wind soon resume their sway, and the beneficent average circulation is maintained from age to age. Nevertheless, in these days of rapid transit, when the passage of a steamship between port and port is reckoned by hours, it remains one of the most important problems confronting the navigator to allow for the incidence of the current upon his vessel, for it must be remembered that, whatever the power and consequent speed of a ship may be, the effect of a current upon her remains the same. It is the movement of the whole body of water in which she floats, and although her speed may be twenty miles an hour through the water, if there be a current of half a mile an hour against her, and it is not known, she will be twelve miles astern of the position she ought to be by her course and distance run at the end of the day. And a corresponding alteration in her position will take place, no matter what the angle may be in which the current strikes the ship. As long as the heavenly bodies are visible and the ship is a good distance from land, it does not matter, her position can be continually verified. But when near land and unable to consult those faithful celestial guides by reason of their being hidden behind a pall of clouds, the sudden incidence of a current previously unknown may mean a terrible disaster, and one too that the navigator is powerless to foresee and consequently guard against. Of course, if the commander of a swift mail steamer, let us say, were empowered, in the absence of celestial observation, to slow down as well as take a series of soundings by the patent sounding machine, the danger of running ashore would be minimized; but even then on certain

steep shores it would be very great. Since, however, time must be kept and risks must therefore be taken, it will occasionally happen that, owing to the set of a temporarily induced current, a great ship may be lost, without any blame attaching to the devoted men who had her and all that she represented in charge.

THE TIDES

THE last chapter was entirely devoted to a cursory consideration of the oceanic currents as distinguished from the regular ebb and flow of the tides. And an attempt was made to explain the difference between current and tide, a very lame one, I fear, for most people cannot help confusing the two, being indeed satisfied to denominate the movement of any body of water in any given direction a current, without any regard to the cause of its movement. But because to the general public the distinction between tide and current is exceedingly hazy, I hope I may be forgiven for again endeavouring to make the difference clear, not this time by a lame simile, but by an exceedingly brief recital of the actual facts concerning each. Current is the movement of a body of water produced by a difference in specific gravity caused by a difference of temperature, or change in salinity, or evaporation, or the drag of the wind along the surface. It is always more or less local, and in several well-marked cases it is nearly permanent in speed and direction. Tide, on the other hand, is caused by the action of the moon and, in a lesser degree, of the sun upon the great skin of water covering two-thirds of the surface of the globe. Four times in each day of twenty-four hours the drawing power of gravity exerted by these

great celestial bodies, either in opposition or conjunction, causes the waters of the various oceans to advance upon or recede from the various shores of the whole world with such regularity that the navigator can calculate with certainty the time of high water at any given port with a very small amount of trouble and mathematical knowledge.

But water being so mobile an element, innumerable complexities occur, due to local peculiarities, to strong and persistent winds, etc., and it is the consideration of these peculiarities that makes the study of the tides so interesting. Moreover, in many parts of the world current and tide meet and act upon one another, introducing further complications, and rendering the seaman's task of allowing for the mysterious movements of the great body of water upon which he floats by no means an easy one. Yet one more complication, which arises from the meeting of the incoming tide from the ocean and the down-rushing torrent from a river. It will sometimes happen that, owing to an extraordinarily heavy rainfall, a river will be so full of water as to rush with much more than its usual impetuosity seaward, and, meeting the ascending flood of salt water, will struggle to beat it back. That being impossible, a compromise is effected by the level of the water rising much higher than usual, overflowing its banks, and spreading devastation all around. The same result may be brought about by a gale of wind blowing directly up a river and aiding the incoming tide by pushing it inland far beyond the usual tidal limits. These limits vary, of course, with the amount of fall or gradient a river has towards the sea; but whatever the limit may be, in a civilized country, at any rate,

there is always a great deal of trouble and worry to the riparian householders when any alteration of it takes place in excess.

I hope that the very simple theory of the tides may be borne in mind, viz. that the moon moving round the earth once in twenty-four hours draws the whole body of water comprised in the ocean up towards her by reason of her attraction. In the open ocean that swelling upwards is so slight comparatively as to be unnoticed, but when any obstruction of land is met with, it becomes at once exceedingly evident, its effects in velocity and height being the more marked in proportion to the ruggedness and sinuosities of the coast. Sometimes the sun, which exerts less attraction upon the sea than the moon, owing to his vastly greater distance from the earth, pulls with the moon, producing the highest tides (spring tides); sometimes he pulls at right angles to the moon, and thus nearly neutralizes her efforts, so that very weak and low tides (neap tides) are the result, and if the attraction of these two celestial bodies were equal, there would be no tide at all. The times of highest tide, or, to use the queer word which astronomers affect, the "syzygy" tides, always occur at new and full moon, and if a gale of wind happens to be blowing in the direction of the flood at the time, an extraordinary elevation of water must take place.

Whewell, a great authority upon the tides, has carefully calculated the speed of the great tidal waves, and has pointed out how greatly they are affected by the depth of the ocean along which they travel. His conclusions are hard to accept by the seaman, for he says that where the water is five thousand fathoms

deep this hill of water following the moon moves at the rate of over five hundred miles an hour, and they vainly ask how it is they have never been met and overwhelmed by this terrific rush of water. But as the wave approaches the shore it is greatly retarded, it "smells the bottom," as we say, and its speed dwindles to fifty and then to fifteen miles an hour, until it enters the various ports and rivers at quite a gentle, nay, almost an imperceptible, rate. Of course this gentle approach varies according to the contour of the land. Where that is fairly level and its bays are open, its rivers regular and easy of access, the tide behaves in genial fashion, and the ebb and flow goes on almost imperceptibly. But in some parts of the world, where obstruction after obstruction is offered to the incoming tide, it rages and foams its way into the indentations of the land, and its coming and going are marked by much the same sound and fury as characterize a mountain torrent, only, of course, upon a vastly grander scale. Of such places one of the chief is the Bay of Fundy, in British North America. The entrance of this gulf is exceedingly narrow, being almost blocked by the Grand Manan Islands, yet the opening seaward is very wide. Into this great bay the tidal wave rolls majestically until it meets with the obstructing islands, and then it rages and tears its way between them and the promontory of Nova Scotia at an enormously accelerated rate. Having poured through the narrow channel between the Grand Manan and Bryer Islands, it rushes on until it finds another inlet inviting it, the Basin of Minas. Into this it turns at a rapid pace, as if remembering how much it has to do in the short time allotted to it, when

suddenly it meets with the very narrow strait between Cape Blomidon and Cape Sharp. Now its fury knows no bounds. The incalculable mass of water piles itself up between those two bluffs in its mad hurry to get forward, until the sight may be seen of dry land only a few hundred yards ahead of a volume of water deep enough to float a line of battle-ship. This great wave rushes up the estuary, filling all the creeks and bays until it reaches the head of Cobequid Bay, Horton Bluff, and Windsor. It seems almost incredible, but it is a fact that at Horton Bluff the tide rises sixty feet above low-water mark. What that means in the way of alteration of the physical aspect of the country during the time of high water almost passes the bounds of description, as does the volume of water required to effect that transformation in so short a time transcend all ordinary calculation. A space of many hundreds of square miles at eight A.M. is bare and waterless, a sandy, rocky desert, without apparently any means of communication, so rugged is the country, and also without, as far as can be seen, being of the slightest service to man. Presently, with a deep hollow roar, as of an approaching earthquake, the advancing tidal wave comes rushing up the narrow estuary. In its mad career it seems as if it would tear up the solid foundations of the earth. And while, spellbound, the onlooker gazes upon this inrush of the ocean, ravines become bays, ugly banks are hidden, towering rocks are submerged, and what was a desolate impassable region of most forbidding aspect has become a noble expanse of navigable water, whereon may float the largest ships in the world. And this transformation has taken place shortly after midday from

breakfast time. Viewed commercially, what an amazing waste of power is here! The mind almost reels in contemplation of the potentialities offering themselves in this unthinkable mass of water raised to such a height twice a day by the calm suasion of the moon. Some day men will find it comparatively easy to set this lifted mass of water to work on its way back, and the power that those pioneers will command will make Niagara but a child's toy in comparison.

But the grand spectacular time in which to view the invasion of the tide here is in winter. Navigation, at the best of times very arduous and difficult in those waters, then becomes impossible, for being entirely outside of the beneficent range of the Gulf Stream, this part of America is, though four hundred miles south of the latitude of London, so cold that the sea itself freezes. And were it not for the tremendous changes in tide level, nothing can well be more certain than that it would freeze as solidly as do the Arctic Seas. But the waters do not get sufficient repose for that. Twice daily that mighty influx of water takes place, hurling before it the floes and miniature icebergs produced by the intense cold—hurls them against the land with thunderous impact, grinding them against the rocks and each other until the whole agitated sea is a *purée* of ice fragments. The interregnum, or, more properly, armistice of slack water takes place and the swirl and crash ceases. All is still save for the crackling of congelation as the half-frozen sea strives to become solid. Then comes the call of the ebb. There is a gentle movement seaward and the partial congelation ceases, the disunited masses begin to circulate round one another. Gradually the movement

grows more definite, its direction more settled, until the whole mass of half-frozen water is rushing resistlessly on its way to the ocean again, leaving behind it the barren forbidding bed of the great bay to its misery of loneliness and utter desolation.

In our own islands something of the same phenomenon may be witnessed, but on a lesser scale and without the icy accompaniment. The great estuary of the Severn—great, that is, for a little group of islands like ours—lies invitingly open to the inrush of the tidal wave from the Atlantic, and consequently the tributaries which pour their waters into this estuary feel the effect of that wave in a marked manner, notably the Wye and the Avon. The rise of the tide at Chepstow is as much as fifty feet, the highest known in these islands. But this great influx may easily be explained by a glance at the map. There is a point of land that juts out just above Portskewett, which intercepts the rising flood and turns it into the narrow channel of the Wye. Fretted by thus being restricted, the foaming waters rise to the abnormal height above mentioned, while the Avon just opposite only gets a fairly normal rise and fall.

The Solway, again, is noted for the impetuosity of the tides, and it is said that a well-mounted horseman on Solway sands, when the tide is turned on the flood, will have need of all his horse's fleetness to escape drowning, so rapidly does the tidal wave come rushing in. But here, the Isle of Man, being moored like some huge ship right in the fairway, does undoubtedly hinder the inrush of the tide, deflecting it on either hand, and taking from it a great deal of its velocity. And this matter of sheltering, either by

an island in the way or by some prominent headland breaking and deflecting the full force of the tidal wave, will be found to account for the immunity of all our more prosperous harbours on the west coast from abnormal variations in the height of their water-level; for such variations are fatal to regular trade, being so often disastrous in their effects upon shipping.

On the east coast, of course, no such tidal troubles annoy. The whole mass of the British Isles intervenes to prevent the tidal wave rushing in straight from its ten thousand mile sweep. It comes, of course, as it must do everywhere (almost), but it comes gently, regularly, and unless, as sometimes happens in the estuary of the Thames, for instance, it is aided by an easterly gale, it never plays any pranks upon the shipping in the river or the householders along the banks. But it quietly raises the water-level and enables the largest ships to get up to their docks, whose gates are opened punctually to tide time and closed again before the water has begun to fall, so that ships of the largest tonnage, safe behind those massive barriers, may lie afloat and discharge their cargoes. This utilization of the tides by man for the docking of ships has been of very great influence in the history of navigation; for, while the smaller vessels may lie aground without any serious harm to their fabric, it always means much inconvenience in the handling of their cargoes; and, as the incidence of high water necessarily varies in time each day, there is the annoyance of the tide serving for handling the cargo in the middle of the night while the day has been wasted. But the larger vessels cannot be treated thus casually, and, moreover,

to earn a dividend for their shareholders, must have dispatch, their daily working expenses being so high. Therefore, in a port like Cardiff, for instance, with a great rise and fall of tide, docks are an absolute necessity. And it is most interesting to a thoughtful observer to see an entire fleet of mighty ships reposing in the deep waters of the docks there, while the work of loading them is going on with the utmost expedition, and at the same time the sea-bed outside the dock gates is bare for miles, just a great expanse of mud and ooze. Then, at the appointed time, the sparkling flood comes gliding in. Gradually it obliterates all the uglinesses of the muddy flats with their stale smells, replacing these unpleasantnesses by a bright flood of clean sea water. The tide rises higher and higher, being carefully watched by those in charge of the docks until the smaller vessels begin to be "locked" out, for the basin of the dock is a lock which may be worked without losing much water from the area of the dock proper. And all the time the water outside is rising until the great gates may all be thrown open, and the largest ships the dock will accommodate may enter and leave, steaming away serenely over what was only a few hours before a foul expanse of evil-smelling mud. This regular flooding of an almost level foreshore with pure sea water, a natural deodorizer and disinfectant, is by no means the least of the services that the tide renders to man, but as the subject impinges upon the function of the ocean as a health-breeder for the whole world, I can do no more than make passing allusion to it here.

The work of the navigator is, of course, immensely

complicated by the tides upon a coast like ours; and this it is which renders local knowledge, such as is possessed by the pilot, invaluable, indispensable. The pilot must not only carry in his head a chart of the coast, with the distances from point to point and the shape of the bottom, but he must know how the tides run in all weathers, how they are affected by the various winds, and the difference between their rates at the various times of the moon's age. Now this is knowledge which is only gained by experience, and although many valuable books have been written as aids to the mariner in respect of the tides' work, it nevertheless remains true that nothing can give confidence in the correctness of the course being steered on a dark or a foggy night like a working experience of those silent movements of the water. Even with long experience there are some who never seem to be perfectly at ease with the tides, as may be seen if you care to watch the movements of the various coasting sailing ships on a fine day. One man, by his almost uncanny knowledge of the streaks of the tide and how to steer so as to get into them, will be observed to slip along past all his competitors, his course being, to all appearance, a most erratic one, yet perfectly calculated to get the utmost advantage that the tide can give him, while other men, who have never mastered more than the broad principles of tide work, even though their experience may be longer, must be content to come tailing along behind the knowing one.

Of course, there is also in certain places the additional complication of current mingling with tide and affecting it, and, as the current is liable to be

altered in force and direction by atmospheric conditions obtaining hundreds of miles away, this renders the work of the pilot more involved than ever. And nowhere in the world are there to be found more varieties and vagaries of tide than there are around these favoured islands of ours, the home of the greatest oversea carrying trade in the whole world. From the raging torrents of the Pentland Firth or the Race of Portland, to the gentle tidal waters of the east coast and the almost unimaginable inrush of the flood found in the Severn and Solway, all the ways in which the moon's influence upon the sea can affect the navigation of waters near the land may be tested in Great Britain.

But as if to prove how dependent the tides are upon the configuration of the land, there is the striking lesson afforded by the great land-locked Mediterranean Sea, and more especially the Black Sea, really an off-shoot of the former. The narrow entrance to the Middle Sea from the Atlantic effectually precludes the inrush of the vast tidal waves of the ocean in sufficient volume to cause such vicissitudes as occur elsewhere. Not that the Mediterranean is, as it has so often been called, a tideless sea. On the contrary, the tide does make itself felt more or less all round the Mediterranean shores, attaining its maximum on the coast of Africa, about Tunis, of an amplitude of about ten feet. On the average, however, the rise and fall is only about a foot or two. Still, the circulation of this great body of water is maintained by currents both surface and lower, in some places attaining such a velocity that they have become a part of classic lore. We need only mention Scylla and

Charybdis to awaken interest in the minds of every public schoolboy, though this race of the Strait of Messina is not much accounted of by the navigator of to-day, and the strait is crossed several times daily by a cumbrous ferry-boat bearing a railway train on its decks.

Strong winds, of course, have their usual influence upon the tides, setting up quite rapid local currents, and causing an abnormal raising of the water in certain places favourably situated for such manifestations. But as far as the tidal influence of sun or moon is concerned, the great enclosed basins show, as might be expected, but little trace of it. They are affected undoubtedly, even those great inland seas of America, with their scores of thousands of square miles of fresh water, respond to the call of the moon, and exhibit a tide which, though almost imperceptible, may still be measured by inches. In like manner the Baltic, protected as it is from the inrush of the Atlantic tidal wave, first by the British Isles and then more closely by Denmark, shows little tidal variation. In fact, as far as the tides are concerned, it is the easiest navigated sea in the world. The maximum rise and fall scarcely ever exceeds a foot; but here, as in the Mediterranean, the currents must be watched, especially during and after gales.

Other almost tideless seas are the Red Sea and the Persian Gulf, and for the same reason their almost land-locked condition. But the immense evaporation that takes place in these inland seas, owing to their geographical position, necessitates a continual influx of the ocean to supply their need, and so there is a steady movement of current in both of them. But

these movements are quite sluggish, for the cooler water of the Arabian Sea, flowing in to supply the deficiency caused by the evaporation, is met at the bottom, its natural place, by the heavy extra-salt water, and the result is a constant struggle between the two, resulting in these two seas being the saltest in the world, as might be expected, seeing how much condensation takes place, leaving all the salt behind, and that no rain falls to redress the balance.

An interesting question in the consideration of the rising of the great tidal waves naturally presents itself—do these swellings of ocean in their path round the world never come in contact with each other, with the effect of neutralizing their forces? This question has been carefully studied by acute investigators, and some very surprising results have been recorded. On the Irish coast, almost opposite to the Bristol Channel, where nearly, if not quite, the greatest vicissitudes of tide in Britain are experienced, there is an utter absence of rise and fall. The ebb and flow are felt along the coast, but the meeting of the tidal waves here produces an equilibrium, and on the shore the waters remain level. There is another area in the North Sea where the tidal waves meet and balance one another so nearly that only an oscillation of a couple of feet occurs. But the way in which the lines of coming and going tide curve and recurve in this part of the sea are so many and so confused that only the brain of a man entirely at home with the higher mathematics could keep the run of them. Another curious result of the meeting of tidal waves is found in some ports, notably in the roadstead of Havre, where the period of "slack water," as seamen term

the period of rest when the tide has reached its highest or its lowest point, and which is usually only a few minutes in duration, is prolonged to half the time of a normal ebb and flow, three hours. Of course, this prolongation of slack water, to the great benefit of all concerned, varies in different places, but it has a very marked effect upon the prosperity of any port thus favoured, if only those interested are sufficiently wide awake to take advantage of it.

And now we come to one of the most extraordinary cases the world can afford of the way in which one tidal wave can neutralize another, one that causes the observer to stand and wonder at the amazing developments of the forces of Nature. It has before been noted how great openings, like that of the Bay of Fundy, for instance, lying invitingly in the path of the incoming tidal wave, do lend themselves to abnormal risings of tide, and how perfectly natural it is that they should do so. Now in South-Western America, wide open to the south-east, lies the great estuary of the La Plata river. It is 150 miles wide, and compared with it the opening of the Bay of Fundy is but a creek. They both face the same way—nothing obstructs the full ingress of the Atlantic tidal wave. Yet whereas, as we have seen in the Bay of Fundy, the tide rise to the amazing height of 60 feet, in the estuary of the La Plata there is practically no tide at all. The effect that this marvellous tidal abnormality has upon the trade of the country is made evident by a glance at the statistics of shipping at Buenos Ayres, but the causes of it are less easy to seek. According to the most competent observers, this calling of a halt, as it were,

in the great tidal movement is the resultant of several opposing forces; but the chief of them is, as I have said before, the meeting of two oceanic tidal streams which neutralize one another.

In places like this, and there are many, as might be expected from the intensely irregular outline presented to the inrush of the tidal wave in various parts of the world, the incidence of the winds play a most important part in arranging irregular risings and fallings of the tide. Where the ebb and flow are fairly regular, as has been already observed, a strong wind will retard or accelerate a tide, but its effect is exceedingly limited. Where, however, the combating forces of the tidal waves prevent any regular ebb and flow taking place, the occurrence of a gale from almost any direction whatever is sufficient to turn the scale, and a temporary rush of water in the direction towards which the wind is blowing will be the result, generally causing the maximum of inconvenience to all concerned.

But leaving for a while the actual facts of tidal incidence and its effect upon commerce, and ascending to speculation, it is always a matter for great wonder to seamen why they do not continually meet in the open ocean with the tidal waves raised by the moon in her regular revolution round the world. It is natural to suppose that the swell of water she raises towards her and draws after her will be of such a size as to cause grave inconvenience, if not actual danger, to vessels which meet it in its long course from continent to continent. Looking upon a conventional diagram showing the influence of the moon upon the ocean, it would appear as if the great mass of water raised by

the attraction of our satellite must, on the open ocean at least, be sufficient to overwhelm any vessel it meets on its way. Yet nothing of the kind ever happens. It is true that occasionally huge knolls of water, travelling at a great rate, are met with far out at sea, causing panic on board the vessels they meet with, but seldom do much damage. It is equally true that these sudden swellings of waters are usually characterized as "tidal waves," although investigation proves that they are nothing of the sort—cannot be, because while the tidal waves are perfectly regular in their incidence, these great uprisings of ocean are abnormal, and are therefore undoubtedly due to some cosmic cause, such as a submarine earthquake or eruption of a deep-sea volcano. Yet in certain lonely, out-of-the-way isles of the sea, such as Ascension, St. Helena, and Tristan D'Acunha, there occurs at irregular intervals a sudden shoreward rush of the ocean, stupendous rolling hills of water which threaten to engulf the land. No one who has ever witnessed the occurrence of the "rollers," as they are somewhat feebly termed, can have any idea of their terror-striking aspect. They occur when the sea is fairly smooth, just furrowed by the usual winds, and there is apparently no reason to expect anything out of the common order of things. Then suddenly, without any warning, will appear in the offing a huge wave reaching from one side of the horizon circle to the other, travelling shoreward at a tremendous rate of speed. Vessels at anchor lie right in its fateful path, and no seamanship may avail to enable them to avoid its awful impact. The few minutes intervening between its first appearance and the shock of its arrival seem like hours, but they pass; it strikes, and the bay is

filled with the *débris* of ships, the shore is a welter of boiling foam, and the people, gazing spell-bound with terror, breathe again as knowing the worst. Contrary to the usual rule of waves, the first of these rollers is generally the most severe. It is followed by three or four others, much diminished; but the damage is done by the pioneer. Then the sea resumes its normal aspect, and the observers are left wondering why this great visitation has come and what is the cause of it, while seamen call it a tidal wave.

Well, since nothing is known of the origin of these manifestations—perhaps one name is as good as another—only, if the tidal wave which rolls round the world twice in every twenty-four hours were always to manifest itself in such a fashion, it is safe to say that very little shipping business would be carried on. No, the work, the beneficent work, done by the moon, and in lesser degree by the sun, in raising the waters of the ocean, is managed in a much gentler fashion than that. Except under abnormal conditions, such as have already been outlined, the tides rise and fall. Just that. The words express exactly the gentle and unobtrusive way in which these great forces of Nature act for the comfort and convenience of mankind. But the terrible manifestation of the "rollers" has been observed and recorded in its most awful aspect during an earthquake or a volcanic eruption occurring near the shore. Then, as if to form the culmination of the terror on land and in the air, the sea first appears to recede, to rush seaward, until the secrets of the depths are revealed, and scenes never before exposed to the light of day become visible. Great ships are left stranded where a little while before they floated in

several fathoms depths of water. Then suddenly the waters return in an immense wave, looking as if it would shut out the sky. I shall not give any of the estimated heights of these waves, confining myself to saying that in the nature of things they must be much higher than those raised by the wind in the most terrific gale, and their speed must also be much greater. For the conditions are quite different. It has been before noted that the drive or drag of the wind along a water surface produces, accelerates, or retards currents, but it never excites the surface to any great rate of speed, while the furious waves have a very short range, doing hardly more, indeed, than rise and fall.

In the shoreward rush of the earthquake wave or volcano wave we have a sudden movement of the whole body of water of incalculable force and tremendous velocity, because, in the first case, there has been an upheaval of the sea-bed at its margin, and the waters have had perforce to roll backward, seaward, and pile themselves up in a heap, as it were. But when the sea-bed subsides again, of course that mighty mass of water seeks its former level with all the vehemence that might be expected of it, rushing over the land to a height far beyond high water-mark, and completing the destruction begun by the earthquake. Practically the same effect is caused by the volcanic rending open of the earth's crust beneath the sea; indeed, the effects are even more dire. For now, in addition to the displacement of a vast body of water, owing to its having rushed down into the chasm just opened, that water has fallen into an incandescent abyss of enormous area, and most of it has been simultaneously converted

into steam, thus liberating forces which threaten to rive the globe asunder. It is, indeed, highly probable that many earthquakes are caused in this way, apart altogether from the dreadful damage done by the mighty mass of displaced water rushing back upon the land, and overwhelming it, as the breaking loose of a dammed up reservoir drowns the whole valley beneath.

Probably, however, enough has been said upon this part of the subject, especially as we are at the close of the chapter; and it would be entirely wrong to leave the reader with the terrible impression of the earthquake wave upon his mind. These incidental happenings are, of course, calamities of the highest order, but they bear no closer relation to the altogether calm and beneficent action of the regular tides than does the hurricane bear to the gentle zephyr or the steady faithful Trade Wind. Drawn by the persistent suasion of our satellite, the sea performs with beautiful regularity its invaluable task of cleansing the shores, which, left without such ablutions, or with only irregular visitations of the sparkling flood, would, in a very large number of cases, be entirely pestilential. It is one of the most important ministrations to earth of the benevolent sea.

THE OCEAN AS A SOURCE OF FOOD SUPPLY

No matter in what light we consider the ocean, the magnificence of every detail thereof strikes us with awe and admiration such as the consideration of no other portion of the globe can produce. Nor can any familiarity with the particular subject under review dispel this, however homely it may be. In the present case, that of food supply, the first thing that must inevitably strike us is the vastness of that supply, so vast, indeed, that it defies our calculations and wraps itself in impenetrable mystery. It is a harvest-field, needing no tillage, and indeed untillable, an inexhaustible field constantly reproducing its harvest, a harvest of good food for man, wherefrom his most energetic efforts can only take the very smallest gleanings; for what are his requirements compared with those of the incalculable army of inedible, predatory creatures in the sea, which must be, and are, all bountifully fed continually? He, of course, is handicapped in the pursuit—many hindrances combine to prevent him from taking his lawful toll of the sea's wealth, and when he does get an opportunity commensurate with his desires, how suddenly is he overwhelmed with too great plenty, abundance which in many cases he can neither sell nor give away, a store of

good food which rapidly becomes an offence to the senses and a danger to health by reason of its essentially perishable nature. It is almost like the manna of the Israelites, which, supplied daily, must be eaten daily, or it bred worms and stank.

And this, too, in spite of the fact that in various ways the harvest of the sea may be stored, may be kept for indefinite periods after special treatment. It is obvious that the quantities which may be thus treated for preservation are strictly limited, and will be still in a special sense, even though the needs of man should compel him to depend more and more upon the harvest of the sea for food. But, before going further, I must, to avoid misapprehension, advert for a moment to what I have said as to the inexhaustibility of the food supply of the sea. I shall be told that in certain regions man's efforts have depleted the sea to such an extent that it has been found necessary to abandon the fishery there, at least partially, as being no longer remunerative, and in other portions of the sea near the coasts of our own islands, for instance, it has been considered essential to enforce certain laws as to prohibiting times of fishing, and also to disallow fishing within three miles of the shore. But this apparently exhaustible character of the ocean as a food store only applies to those portions of the sea easily within man's reach, as on certain banks in the North Sea, every foot of which may be dredged over by the powerful steam trawlers, and to the shallows near shore which have been so long and patiently searched by the fishermen. Moreover, in the former case the peculiar kinds of fish which are becoming scarcer, and are, as the fishermen say sometimes, not to

be found at all, are those whose habits render them peculiarly liable to extinction wherever man can reach them—flat fish of all kinds, which lie on the sand ready to be scooped in by the dredger or trawl. The marvel is, not that these banks should begin to show signs of depletion, but that with so restricted an area and such extraordinarily sluggish fish, whose flesh is so delicate that the demand for them exceeds the supply, that they have not been completely cleared of fish long ago—by the efforts of the trawlers alone, I mean, and without taking into account at all the operations of their natural enemies, who can and do pursue them everywhere and at all times of the day or the year, preying upon them from the time they are deposited as ova until they attain the size of edible fish.

There is also another side to this tale of depletion. Many experienced fishermen aver that so far from trawling exhausting the supply of fish on any given bank, it cultivates a continuous supply. I have often heard tales of certain ridges and valleys on well-known banks which have been avoided by common consent of the fishermen in order that they might see if the fish would increase in numbers, but so far from that being the case it was found that the fish disappeared altogether, owing, so my informants believed, to the fact that they, the fish, had been accustomed to have their natural food stirred up from the bottom by the drag of the trawl, and not finding it as easily obtainable as it used to be, they had deserted the spot altogether. Of the truth of this I can say nothing; I can only record the fishermen's evidence. But with regard to the necessity for protecting the fish on

the shallows near the shore, there can be no conflict of opinion. There is, however, very grave difficulty in carrying out such protection; for the only way to do so efficiently, would be to prohibit shrimping altogether, inflicting great hardship upon a large body of hard toiling men, who, in gathering their curious harvest, destroy enormous quantities of immature fish which abound in these shallows, in order to escape the depredations of their natural enemies, who frequent deeper waters.

But when we have admitted all we can on the score of exhausting any portion of the harvest of the sea, we have really come to the conclusion that the subject is hardly worth consideration. It can only affect the flat fish, and only then in certain very restricted areas, so that it may, indeed, be said that the harvest of the sea is inexhaustible without fear of contradiction. Moreover, such is the fecundity of the sea that it is certain, however far man's inventive powers may enable him to reach down into the as yet unfished depths and draw from their limitless stores, he will never be able to make the least impression upon the incalculable wealth of the sea in food. For what, after all, are his puny efforts compared with the never-ceasing devourings of the sea-monsters? It has been calculated that an adult rorqual will require and obtain at least two tons of herrings every day to satisfy his hunger, and who knows how many of these ravenous whales accompany each school of herring, to say nothing of the dog-fish and other devourers, whose depredations are even greater by reason of their mighty hosts. These, however, are, as must necessarily be the case, but general statements, and it is time to

particularize a little, to survey the various parts of the ocean within our knowledge, and make some effort, however feeble, to realize what this beneficent element holds in store for the sons of man in the way of food.

So vast is the sea, that the mere fact of being able from so infinitesimal a speck on it as a boat to let down hook or net where the bottom may be reached and be sure of bringing up some kind of fish, will, if we think for a moment, fill us with amazement at the amount of its population. It is as if a balloonist, stealing silently along at night over an utterly unknown country, should only have to let down a basket on a line to haul it up almost immediately filled with good food. But when we remember that at certain seasons and in certain places this population is augmented to such an extent that it can only be compared to—but, no, we have nothing at all on earth with which the wealth of the sea can be compared. Not even the swarms of flies in the most vermin-haunted regions of the earth can for a moment compare with the solid armies of the herring, the mackerel, or the cod. Take, for instance, the first of these citizens, the one with which as food we are most familiar, but of whose habits even the most learned of sea-naturalists know so little—the herring. From those hidden recesses of the sea, where the infallible instinct of the female *Clupea harengus* bids her lay her hundred thousand eggs, he emerges, a host uncountable, nay, unthinkable, in its numbers. And yet he has been providing food for vast numbers of other fish during the period between his appearance as an egg and his attainment of adolescence. Suppose that those natural checks upon his numbers could have

been removed? Is it too much to imagine that, for such a host as he would then have presented, the ample ocean itself would hardly have afforded room? Fanciful as the idea may seem to some, I know of no better way of converting a sceptic to such an opinion than to show him a school of herring on the march, and ask him to try and assess their bulk and weight, to say nothing of their numbers. Even spread as a thin layer over several square miles of sea, they would appal us with their profusion; but when we remember that these schools are many feet deep, and that just the remotest corner of them impinging upon the nets of a fleet of fishing-boats will suffice to load them all, if the nets do not break, we get a faint idea of what is meant by the wealth of the sea.

As far as we are concerned in Britain, the principal visitants among fish to our shores, for the purpose of spawning, are herring, pilchards—which are a species of herring—and mackerel. The former are the most numerous, and are rightly accounted the most valuable, because as a food-fish they have really no rival, whether fresh or cured. If only they were less plentiful, they would be placed on an equality with the lordly salmon, and would certainly, if scarce, be as costly. But, fortunately, they are not, and their cheapness and consequent accessibility by the very poorest should never blind us to their super-eminent virtues. With wonderful regularity they appear from the remote depths, where they feed and grow fat—on who knows what incredibly abundant stores of their special food—for their long patrol of these shores in order to deposit their ova. All through that long march, although they furnish such abundant supplies

of food for others, they themselves eat not, for whoever saw a herring with any food in its entrails? Therefore they bring us the hidden riches of the ocean, and distribute that wealth in most lavish fashion, retiring again—those that survive, lean and starving—when their mission is accomplished, to the feeding-grounds whence they came, and whose locality is known to no man.

In the same mysterious fashion come the mackerel, but far less regularly, and certainly with much more independent movements. Nor do they fast upon their visit, for the mackerel is among the most ravenous of fish among all the finny hosts noted for their insatiable appetites. And while his legions are also in number like the sands of the sea, they are as far inferior in quantity to those of the herring as is his flavour to that of the commonest of fish. There is really no comparison between them in point of value, but still they do furnish an enormous supply of cheap food, and as such are highly esteemed. And if only it were possible to increase the means of distribution of these two fish among our poorer population, there would be far less hunger than there is, for the enormous supply would enable them to be sold in the remotest inland village at a less cost than that of any other form of food, while the fishermen would not need to sell them to the distributor at any less price than he now receives. At present, the difference between the price received by the fishermen and that paid by the consumer is anywhere between 1000 and 2000 per cent., which goes a great way towards neutralizing the benefit conferred upon our people by the benevolent sea. This enormous increase in

price, owing to the greed of the middleman and the difficulties of distribution, will one day certainly be lowered as the need arises, for men will no longer consent to go hungry while such superabundant supplies of food are being wasted.

But, after all, vast as are the supplies of herring and mackerel brought to our thresholds by the instinct of the creatures themselves, there are also enormous hosts of other fish which abound in our seas within comparatively easy reach, but which, owing to the lack of distributional facilities, are dear, and indeed almost unattainable by people of moderate means in inland towns and villages. The west coast of Ireland, for instance, teems with fish of the best quality, which are obtainable, weather permitting, all the year round. Yet the people of Ireland lack food to the extent of living upon potatoes, buttermilk, and Indian meal, with all this wealth of succulent brain-building food clamouring at their very doors. It is sad to think of, but I console myself by remembering that these anomalies right themselves, or rather, are righted, in time; only the marvel is, that an intelligent people should for so long be content to submit to such deprivation of what is not only their undoubted right, but what would, properly handled, secure to a large proportion of coast dwellers a good livelihood. At present, however, food of many kinds is fairly easy to procure from the land—nay, from many lands having a surplus—because of the ease and facility with which our ships come and go. But if, and when, these new lands need their food for themselves, or the commerce on which we rely is hindered by any cause, it will become absolutely necessary to find other sources of

food supply, and then the treasure of the ocean will be eagerly pounced upon, much as it is now neglected.

The process of garnering the harvest of the sea is, I will admit, in some places a severe one for those engaged therein, but where it is imperative that it should be carried on, that never hinders. I have heard the tale several times that the reason why fishing is not more generally carried on upon the prolific fishing-grounds of the west coast of Ireland is because of its hardships, owing to the inclemency of the weather and the infrequency of the gales, which, if true, would only argue that the west coast Irish were such a feeble folk that they were hardly fit to live on the threshold of so teeming a sea-pasture. But it is not true, nor anything like true, any more than the specious tales of the unemployed, which draw thousands of demoralizing pounds from the charitable, are true. For inclemency of weather and gales, look at the Norwegian coasts, the shores of Iceland, the littoral of Labrador, yet there the inhabitants must fish or starve. Compared with the rigours of those fishing-grounds, the west coast of Ireland is a paradise, even in winter. No, other reasons must be sought for the lack of enterprise shown by Irish fishermen, these are too weak to hold water. I have a shrewd idea of the true reasons myself, but I do not wish to raise strife by opening up a vexed question with which my subject has naught to do. One thing cannot, at any rate, be brought within the region of controversy, which is the fact of the abundance of the best edible and easily caught fish in close proximity to the abodes of the poorest people in the world.

Before going too far afield, let us glance for a little

at the work of our own fishermen sailing from Grimsby, which is known as the greatest fishing-port in the world. Steam has revolutionized the industry as carried on at Grimsby; it has also allowed the fishermen to go as far from home as the Arctic regions almost in quest of their finny prey. Yet, owing to the well system, they find it possible to keep their catch alive, and land them in almost as good condition as if they were caught just off the Humber. But this habit of theirs of roaming so far away from home, acquired of late years, has often got them into serious difficulties. The Danes, who own Iceland, but get very little good of it, are intensely jealous of their rights and dignities, as small nations and peoples always are; and so, although the territorial limit of three miles off shore might as well not exist for all the difference it makes to Denmark, she keeps a gunboat on the prowl in order to seize any hapless Grimsby trawler that may chance to be fishing so near to these inclement shores as to get within the three-mile limit. The penalties enforced are tremendous—confiscation of gear and catch, and the infliction of a hundred-pound fine is the usual ruinous mulct, entirely so to a small owner, but pressing terribly hard upon the men. Of course, it may be said that they have the remedy in their own hands: to keep away from these inhospitable shores. That is true, yet until fishermen learn that it is not necessary to fish in such shallow water in order to secure most abundant hauls, and that with modern gear the extra work and time involved in using a few fathoms more of line is not great, these unpleasantnesses will still go on. Truth to tell, fishermen generally believe that beyond a certain shallow depth,

such as may be found on the Dogger Bank and other similar plateaux in the North Sea, the fish do not congregate, and they will not go there to look for them. Of course, where the water is very deep the labour of the fishermen is or would be tremendously enhanced, as would the amount of time taken; but I believe the fish would be found just as plentiful as in the palmy days of the bank-trawling, where the trawl could not be dragged too long because it would be too heavy to heave in. And it is a question easily answered, I think, whether it would not be better to undertake deeper trawling nearer home than go so far afield and take so many risks. But it is a difficult matter to advise experts; and, besides, it savours, to them at any rate, of impertinence, so perhaps I had better refrain from further attempts in that direction. What, however, I would like to say before leaving this section is, that the wealth of the sea in edible fish is by no means confined to the shallows and banks near our shores, but is spread with fair partiality over the sea-bed, even to depths undreamed of by the ordinary fishermen.

Cross we now the broad Atlantic to those wonderful plateaux in the sea, whereof Kipling wrote so graphically and so truly in "Captain Courageous," the Newfoundland and Nova Scotian Banks. Here, indeed, we have a preserve of Nature's own making, which man, come he in never so many numbers, can do naught to deplete or even lessen. This is, perhaps, the most thickly populated cod-country in the whole watery world. I say perhaps advisedly, for since our ignorance of what obtains beneath the ocean's surface is so vast, it is hardly safe to generalize from the few facts which

we undoubtedly do possess. It is true that our imagination, be it ever so vivid, can hardly picture to us any portion of the sea more densely packed with great fish than are the Newfoundland Banks; but, then, oceanic facts are given to transcending the efforts of the imagination. Here, at any rate, there are no interferences with natural laws on the plea of protecting the deep-sea denizens from man. Also, there is no territorial jurisdiction, because the banks are all much more than the stipulated three miles from any coast. Like the ocean, this splendid fishing-ground is free to all; and all may know that, toil as they will, and have what success they may, they will not, because they cannot, diminish the plenitude of the supply by one jot, any more, indeed, than they could decrease the water of the ocean by using a hand-pump. And this would remain true if the fishing fleets were augmented a hundredfold, because the hidden wealth of the sea is incalculable by man. Only, he is apt to form his conclusions from what he sees, and forget the magnitude and importance of the unseen, which, of course, is but natural.

The enormous area over which the cod range in their countless myriads, numbers beyond all the powers of human imagination, embraces between fifteen and twenty thousand square miles, and its finny population do not merely overlay the bottom in one stratum, but in many strata, so that the depths are thick with them. They are not found in the same numbers at all seasons, moving hither and thither, but not far, in their search for food at times, although generally that food comes to them, and thus obviates the necessity of their travelling far. But even at their slackest time they

must be amazingly numerous when compared with the flocks and herds of the land which must be so carefully preserved and fed by the hand of man. And all along the northern littoral of America, as far as the confines of the frozen sea, fish of many kinds, but almost all edible, are to be found in the same mighty hosts, the inclement weather above the sea affecting them not at all. Here, again, the toll taken of them by man is so small as to be entirely negligeable, it probably does not amount to as much in a whole season as would be devoured by two or three adult rorquals. Does it not, then, seem strange and unfortunate that whole populations should ever die of famine with such boundless stores of food available, if only means of transporting it were organized?

Not only are fish in large quantities to be found within a few miles of the shore, but the labours of the United States deep-sea dredging expeditions have proved that in depths beyond those ever reached by fishermen, or ever before dreamed of as available for fishing purposes, such valuable food-fish as the halibut and other varieties of the *pleuronectidæ* are to be found in great numbers and of huge size. And in those depths of water the range of such fish is vastly extended, because below a certain depth it has been proved that the temperature of the sea is everywhere equal, and temperature is one of the greatest factors in the distribution of fish of edible kinds which are all addicted to coolness, loving their environment to be a little only above freezing-point. The greater part of the North Atlantic Ocean, then, north of the tropics, is an immense reservoir of fish, practically of all the edible kinds, of which it is well within the truth to

say that not one ten-millionth part is utilized for the food of man, despite the fact of the difficulty of feeding sufficiently the toiling millions of workers upon nourishing and palatable food. With the advance of science, new methods of food-preserving have attained to such perfection that it is not too much to hope that before long more attention will be paid to the harvest of the sea, in order that it may be delivered to inland populations without being rendered tasteless and even detrimental to health by being over impregnated with salt, an effete and barbarous method of preserving food, which will surely disappear with the spread of knowledge. Even now it is a well-known fact that our splendid floating hotels carry with them from home sufficient fresh fish of the most valuable kinds, such as salmon, trout, turbot, and lobsters, to provide dainty dishes for their passengers throughout the whole of the voyage. It only needs an extension of this principle to the land for inland peoples to be fed on fresh fish at reasonable rates which shall yet yield large profits on the capital employed. There is really no more difficulty in doing this than that which has been so successfully overcome in America in the matter of fresh meat. The great butchers of Chicago have practically eliminated the butcher's shop. Their travellers pervade the country, taking orders for meat, which is sent to their demand in refrigerator-boxes, stowed in refrigerating-cars, so that remote hamlets, thousands of miles away, get their fresh joints from the great stockyards controlled by such giants of commerce as Armour, Swift, and Cudahy. With the "Trust" methods of these leviathans I have here nothing to do; I hate them, and feel that they should

be kept within bounds by the State; but I have nothing but admiration for the legitimate business enterprise which they exhibit.

Of the abysses of the Atlantic I have said nothing, not believing that they, although containing undoubtedly immense quantities of fish which may be eaten, will ever be exploited; for many reasons, chief among which is the fact that deep-sea fish, so far as we know, are, although eatable, very hard and tasteless. They may, of course, be treated as the Italians treat the tunny, an essentially deep-sea fish, namely, by boiling in oil and preserving the flesh in tins; but that is too costly a process ever to solve a food problem where cheapness is the first consideration. Nor have I said anything about the commercial aspect of dealing with the non-edible creatures, such as seals, whales, etc., which in the past have been caught merely for their oil and skins, but are now being utilized entirely by the enterprising men who have established factories on barren coasts to deal with this hitherto undeveloped mine of wealth. But since manure derived from animal substances, such as bone or fish, plays such an important part in the production of our food ashore, I do not think this new venture ought to be lightly passed over. More especially as it fulfils that first essential of successful enterprise to-day, namely, that of utilizing products which have hitherto been regarded as waste. In many places, but notably in Newfoundland, the chase of the whales, hitherto regarded as useless owing to the low value of their oil, as well as its small quantity, and also the extremely scanty amount of baleen or whalebone to be got from them, is now being carried on

with ardour, only tempered by the fact that for much of the year the weather renders operations impossible. But before very long we may see many other such stations established in more temperate places, and what is now but a small industry greatly extended, as indeed it deserves to be. And also, although it must ever involve hard and extremely filthy labour with the maximum of discomfort, it will be but a pleasurable amusement compared with what the old-time whalers must needs have endured, while its gains will be out of all proportion greater for the workers.

All around the shores of the Antilles and in the Gulf of Mexico and Florida the wealth of the sea in fish is, while still enormous, not to be compared with that of the northern coasts of America and Europe, nor is the fish of anything like so highly edible a quality. Moreover, owing to the intense heat of the atmosphere causing putrefaction to set in so rapidly after capture, it has not yet been found practicable to preserve fish here; although, if the fish were highly sought after for their food qualities, that could easily be got over by the refrigerating method, and cold storage would keep them sweet as long as required. A somewhat striking example of this was brought under my notice a few months ago. Returning from the West Indies in a swift steamer, we carried a large number of living turtles in shallow tanks for the delectation of gourmands at home. These curious reptiles will not feed in such captivity, and consequently, as might be expected, they occasionally die. An experienced eye can always detect the symptoms of approaching death, when an order is at once given to the butcher, who cuts the throat of the creature,

or, as an Irishman would say, kills it to save its life. It is then placed in the refrigerating room, where the natural process of decay is at once arrested, and in due time the frozen body is landed, fetching a good price, if not so great as it would obtain were it living. This, of course, can be done, no matter how high the temperature may be at the time.

It is a curious confirmation of the statement of the greater value of the northern fish, that a large trade is done with the West Indies in salted cod and herrings, and even mackerel from the United States and Canada, although only the lower grades of fish are sent. The people inhabiting these islands and the coasts of the Spanish main, though loudly vaunting the merits of fish caught locally, crave for the northern fish—hard, bitter, briny, and tasteless as they may seem to us. But, indeed, with the exception of the flying-fish industry at Barbados, the fishing in these islands, and all around the shores of the Gulf of Mexico, is almost entirely neglected, although why it should be so is a mystery to me. Of the wealth of these seas in fish, however, there has never been, because there cannot be, any question whatever.

Crossing the equator and coming south on either shore the same thing is observable. Fish there are in abundance, but as far as man is concerned there might as well be none. Truly the land is but sparsely inhabited, and consequently there is but little demand for this valuable form of food, but still the absence of enterprise in this direction is very plainly marked everywhere. It is not, however, until we reach the Southern Horn of Africa that this indifference to ocean's bounty becomes to the fish-loving observer a

thing to be marvelled at exceedingly. Here are to be found fishing grounds as prolific, I suppose, as any in the wide ocean; and the fish are of the same high quality as those in the north, owing to the fact that the temperate zone has again been reached. Every mile of the shores of South Africa above, say, 28° S., is simply infested with the most delicious fish—there are supplies, if needed, for all the peoples of the world which are not drawn upon at all. And that is by no means all. Right off the Cape of Good Hope itself, out in the great Southern Ocean, is to be found the Agulhas Bank, with an area as large as Wales and an average depth of about forty fathoms, which is teeming with splendid fish that are never molested save by the becalmed sailing ship, which, dropping a deep-sea lead-line, with a couple of hooks attached just above the lead, seldom fails to secure a couple of magnificent cod in the momentary interval between sounding and hauling up. Perhaps some day, when South Africa comes to her own and has a great population, this great reservoir of good food will be drawn upon; meanwhile it lies fallow as it were, only kept in equipoise, prevented from overcrowding the seas by the natural checks ordained to that end and constantly in operation. But, indeed, as I am never tired of pointing out, those checks need continually to be exerted, for man's toll of the wealth of the sea is so utterly trifling as to be safely disregarded in the oceanic scheme of life.

Now we enter upon an ocean which laves the shores of some of the most hardly bestead peoples in point of food. As we go up the East African littoral, passing between the great island of Madagascar and

the mainland, we find the sea everywhere replete with the most delicious fish. Here I have seen them in such enormous quantities as to make me gasp; but a fishing-boat is a rare sight indeed. Well, that accounts, of course, for the neglect of the fish, for the people being very low in the scale of civilization, and not at all given to nautical adventure, are precluded from taking toll of the sea as they otherwise undoubtedly would. Here, as everywhere along this coast, the only native seafarers are the Arabs, and they are far too energetic in money-making on other lines to become fishermen. Fishers of men they have always been until Britain stopped them (they do a bit of it even now, when they get a chance), and born traders they are, of course, but fishermen! oh no; the gains are too small. And as for food, well, whoever lacks in those regions, be very sure that the Arab will not. Occasionally, in some harbour or sheltered roadstead, a scattered few fishermen will be seen plying their profession in a timorous, tentative fashion, but nowhere as if they had any heart in their work. Zanzibar Roads, for instance, swarm with fish of great size and delicious flavour, but the utmost number of fishermen I have ever seen there at work has not exceeded a dozen at one time, although there is a teeming population on the island, and plenty of money wherewith to buy. The same story holds good of Madagascar; the natives, though fond of flesh food, do not fish, apparently do not care to draw upon the vast supplies of succulent food the sea brings up to their very doors.

Right up along the African coast to Somaliland, along the shores of the Red Sea and the Persian

Gulf, the same neglect of the sea's riches is to be seen, but with greater excuse, since here the natives are entirely disinclined for seafaring, and besides their numbers are very small. And now we come to the vast continent of Hindostan, with its thousands of miles of sea-board, with its hungry millions of inhabitants swarming along those easily accessible shores, people essentially maritime and inured to seafaring, but we must deal with them in another chapter.

THE OCEAN AS A SOURCE OF FOOD SUPPLY (*Continued*)

It cannot be said that, compared with many other parts of the ocean, the Arabian Sea and Bay of Bengal show an over-abundance of fish. There are no immense shoals to be seen there, as, for instance, are of constant occurrence in the temperate zones—yet there is a bountiful supply of fish near the shores to be caught with hook and line, if not with nets. And fish is, moreover, the only form of flesh food permitted by their religion to millions of these hungry coast-dwellers, who, like the vast majority of the inhabitants of Hindostan, are always hovering on the very verge of famine. Yet here, again, the strange spectacle may be witnessed of a whole people, who may never be said to have their hunger fully satisfied, neglecting the bountiful provision which Nature has brought within their reach. Such feeble and futile attempts at fishing as are made in some places excite our wondering pity, both at the inadequacy of the equipment used and by the calm fatalistic daring of the fishermen. Here may be seen the fisherman putting forth upon the bosom of the mighty deep upon a contrivance the invention of which is almost coeval with navigation — just three cocoa-tree logs, each about eight feet in length, ten inches across, and six inches

through, the two outer ones having their ends slightly curved inwards towards each other, and the whole seized together with lashings of coir spunyarn. For all equipment the fisherman has a paddle, a rush basket lashed to one of the seizings, and his coir fishing-line, with a polished stone for sinker. He is naked all but a loin-cloth, or dhoti, and a turban, in the folds of which he may sometime keep a leaf of tobacco and a small coin. Thus, without food or water, he will venture as far as three miles from the shore, and remain tossing upon the heaving billows in the attitude of prayer, his knees calloused like pieces of rhinoceros hide, for sometimes the whole night through. And, if he be exceptionally fortunate, his whole catch may sell for the equivalent of eightpence, or eight annas. There is, to my mind, something mysterious about this lack of ability to extend or improve upon such a miserably inadequate and painful way of fishing.

For the people are fond of fish, not, as far as I could see, eaten fresh, though that may be because of the exceedingly scanty supply, but highly salted and dried to the hardness of wood. These are mostly a kind of ribbon-fish, something like a flattened eel, which are scorched over the fire, then rubbed up into a rough powder and mingled with curry to flavour the everlasting rice. A further proof, if any were needed, that it is not from any reluctance to face the sea in its most perilous forms that the fisheries are neglected may be found in the existence from time immemorial of the pearl fisheries in the Gulf of Manaar, on the southern shores of India. Here the natives almost live in the sea, diving for pearls, and making fortunes

—for others. They toil like slaves and live like fish, but with far less food, at what is one of the most dangerous and distressing occupations known. Their lives are short and hard, and certainly the ordinary fisherman's calling, onerous and uncertain as it is, cannot be nearly as much so as theirs.

The whole coasts of the Bay of Bengal are thus neglected in the matter of fishing, and it is not until we reach the coral groups of the Maldives and Laccadives that we find a regular fishing population, driven to thus seeking a livelihood by the scantiness of the food supply on shore. But when we enter the Indian Archipelago, that marvellous congeries of huge fertile islands, we find again the same indifference to ocean's wealth, except where the frugal and industrious Chinese are at work. But here a curious trade begins, dependent entirely upon the strange tastes of the wealthy in China itself. Neglecting the many fine fish that abound, the seafarers, mostly Malays and Siamese, with a sprinkling of Chinese who attend to the business side, the fishermen here catch sharks for their fins, and search the crowns of shallow reefs for the *Holothuria*, or sea-slug, a black, loathsome-looking tube, which exudes, when touched, a variegated skein of slimy threads together with fragments of coral. These two curious products of the sea are boiled, dried in wood-smoke, and stored for conveyance to China, where they fetch a price, varying according to some strange standard of quality, from £100 to £200 per ton. With them is also conveyed another strange food, which, while not strictly a product of the ocean itself, is closely allied thereto, I allude to the nests of the sea-swallow (*callocalia esculenta*), which

are only found adhering to the sides of sea-washed caves inaccessible by land. These nests are, like the sea-slug and the shark's fin, highly glutinous, and as such are prized by the wealthy Chinese. In this strange branch of the fisherman's trade a very large number of the semi-savage but wholly nautical denizens of those shores are constantly engaged, since their more congenial occupations of piracy, slave-raiding, and head-hunting have been effectually put a stop to by the exertions of our watchful cruisers, much, of course to the disgust of the artless Malays, Siamese, and Dyaks, who cannot for the life of them understand why these old-established customs of theirs should be interfered with by a set of meddlesome strangers.

But of fishing, pure and simple, there is exceedingly little until we get to the Chinese coast, where, for the first time since we left the shores of Europe and North America, we find genuine fishermen devoting all their time and skill and industry to the collection of the harvest of the sea. Of course, knowing what we do of the omnivorous habits of the Chinese, who have extended their list of edibles much farther than any other nation under heaven, we are not, or should not, be surprised at this. At the same time, it must be admitted that Nature has not been as lavish to the Chinese in the matter of fish as she has to more northern nations. The Chinese coasts know no shoals of herring, or mackerel, or cod coming periodically in their innumerable hosts to given points, apparently for the sole purpose of being caught and utilized for the food of man. No, the fish-supply of China is scattered, diffuse; and the Chinese fishermen must put forward all his patience, energy, and skill

to get a haul which will be remunerative even to his modest ideas. Not the least curious of the Chinese methods is the one that, even as I write, is being exhibited in the London Hippodrome: the utilization of trained cormorants for the purpose of fishing, a method of hunting fish akin to the ancient sport of hawking, and one that with the Chinese has doubtless been practised from time immemorial. It may, however, be taken for granted that in all methods of obtaining food, whether by land or sea, the Chinese will take the very highest place, first because of their patience, next because of their skill, and thirdly because all is food that can be eaten.

Diverging for a moment to a group of islands not far from the coast of China, the Philippines, I found there, amid a great neglect of the offshore fishing, a curious little method of fishing practised in Cebu and Cavite Bay. The natives would come off in their canoes and make fast to the side of a ship. Their lines were of exceedingly fine twisted grass and their hooks very small. The bait they used was rice boiled into glue, and they each carried a bottle-shaped basket of cane with a small opening in the side. This they put into the water secured by a line. As each fish, small mullet-like creatures about ten inches long, was hauled up, the fisherman, holding one end of a disgorger in his mouth, freed the hook, which the fish has invariably swallowed, with a most dexterous movement, and dropped his prey into the floating basket. In a couple of hours a basketful would be secured, and the fisherman, making all speed shoreward, reaped, let us hope, a goodly reward, in his opinion, for his labour. With this sole exception

the fishing in the Philippines seemed to me about on a par with that carried on in all the rest of the East Indian Isles.

And now, as we go north, we come to what I think all unbiassed and thoughtful opinion concedes is the most marvellous nation in the world, Japan. Coming late as they have into the comity of nations, they have proved themselves to be superior in nearly every respect to all other nations, even where their ideas differ fundamentally. But with the nation, as such, we have now no concern, only the fishing part of it. Japan, like Britain, is an island nation, and at no part is it very far from the sea, consequently, although the land is cultivated with a minuteness of perfection unknown elsewhere, the harvest of the sea is never neglected, and, to the bulk of the Japanese, fish is a daily article of diet. But the Japanese is not by any means an omnivorous feeder like the Chinese, rather is he dainty in his tastes as in his appreciation of the beautiful; and so we do not find the strange, the *outré* forms of ocean's denizens served up to the eater in Japan. Still it must again be noted that, compared with the enormous supplies of fish daily brought within our reach in Britain, Japan is comparatively poor, the stock of fish is exigent compared with ours, which we do not at all appreciate as we ought. Still, with all its drawbacks, the Japanese attend so diligently to the harvest of the sea, that it may safely be said that in no country in the world does fish bulk so largely in the daily diet of the inhabitants as in Japan, which is just what might have been predicated of so enlightened and painstaking and frugal a people. No doubt, since their acquisition of the

half of Saghalien Island, and their consequent free access to the prolific fisheries of the North, they will be able to extend very greatly their supply of this nourishing food for their hard-working and meritorious population. As it is, it is only stating the bare truth to say that in no country in the world is such great and careful attention paid to the fisheries; and now I see that an attempt is being made to compete with France in the supply of sardines preserved in oil, for it is said that the finest sardines in the world are found in the bays of the coast of Japan. An amazing fact, too, may be noted in connection with this, viz. that about one-twelfth of Japan's teeming population is engaged in her fisheries. I should not be in the least surprised were Japan to revive the sperm-whaling industry, to her own great benefit, since her business-like people cannot be ignorant of the fact that, for a century, the "Japan Grounds" were the richest and most favoured of all the whaling-grounds of the world visited by American and English whaling vessels.

The Arctic regions of the Pacific are, like the corresponding latitudes in the Atlantic, wealthy beyond account in fish, but, unlike the Atlantic, there is a dearth of fishermen and of markets. I can never forget the infinite abundance of the finest fish in the shallow waters of the Okhotsk sea, where by day or night anywhere a line had only to be let down to secure instantly some splendid specimen of the finny tribes. All were large, and all were delicious, the *salmonidæ* predominating. Here, I think, must be the great feeding-grounds for the salmon, which, ascending the Columbia River, in Oregon, furnish so large a proportion of the peoples in Western lands

with delicious food in tins. The salmon is a river-caught fish, but he attains his fatness in the sea, and therefore I have a right to claim him as a portion of the wealth of ocean, lavished in overflowing measure for the food of man. But he is not caught at sea to any extent, for the simple reason that there is no one there to catch him. Such fishermen as there are in those wild and inhospitable regions are busy taking the whale for oil and baleen and the seal for fur, and fishing for food as a matter of commerce is practically non-existent, with the exception of a few scattered Indians who catch the dry fish to feed themselves and their dogs upon. And all down the Pacific shores of the United States, although fish are very plentiful and there are huge numbers of people to be fed, so great is the wealth of the land in food, and so small are the gains to be made in the catching of fish, that fishing as a business is very much neglected even now. And so it is all the way down to Cape Horn, the monotonous tale of the bounty of the sea being thus lightly passed over must be told and retold, but with one pleasant reflection, which is, that whenever the hungry peoples of the earth need food it will always be there awaiting them, for the gifts of the ocean are never withdrawn.

It may possibly appear as if I had too lightly passed over this vast extent of coast, where, indeed, there may be many ways of fishing, and many races of fishermen; but I hope it will be remembered that I am not considering so much the many modes of fishing practised in the world, as the capabilities of the ocean for supplying the needs of all who may apply to it. There are few places, indeed, where, given the

proper knowledge and perseverance, the ocean will not be found to be a far richer harvest-field than the land, and that with vastly less labour than the earth demands from those who till it. Now we must go north again; for the Pacific, unlike the Atlantic, has all down its centre, and scattered over its vast area, a large number of islands, inhabited by most interesting peoples, and especially so for our present purpose. First of all, let us consider the beautiful Hawaiian Group, or Sandwich Islands, now a part of the great United States commonwealth. These splendid islands, set in a silver sea, are inhabited by a gentle, amiable race of almost amphibious natives, who, from very early times, have been fully alive to the advantages the sea had to offer them in the matter of food; in fact, it is not too much to say that, with the trivial exception of a few birds, the only flesh-food known to these Hawaiians, until the arrival of Captain Cook among them, was fish—if what at first sight may appear an Irishism be permitted. Of fruit and vegetables the kindly earth yielded them an ample supply, but like all unsophisticated mankind, they craved for animal food as well, and they found in the seas laving their shores an inexhaustible supply of the most varied kinds. The desire to capture fish stimulated their inventive genius both in the direction of canoe-building and in the manufacture of fishing-tackle, in both of which arts they developed amazing fertility of resource, in the entire absence of metal tools. Nowhere in the world are there to be seen such wonderful pieces of workmanship in the way of hooks, lines, and nets, wrought in the crudest way and from the most primitive materials, as may be witnessed in the Pacific

islands even now, although the march of civilization is fast sweeping those early arts away, and replacing them with the more useful and durable, but far less interesting and picturesque, tackle of Europe and America. I have not been in Oahu for many years, but even so long ago I saw that the steel fish-hook and the cotton or hemp-line was becoming universal in use among the natives, and now, I suppose, it would be almost impossible to find any of the fishing-tackle of native manufacture in use among them, or, indeed, outside of a museum.

Out of the husk of the cocoa-nut, most unpromising of fibres, from its rigidity and hardness as well as shortness of fibre, the patient native spun his lines of a fineness and durability quite marvellous to see, especially when it is remembered that no mechanical appliances were available, only the twisting up by the fingers and the dexterous rolling on the bare thigh to give the necessary "lay" to the line which makes for strength. For the finer parts of the line, such as the "snoods" of the hooks, etc., human hair was used, and very fine and strong it was when spun up. But it was in the hooks that the inventive genius of the Kanaka showed itself principally. Some were of pearl-shell, patiently ground down into a hook shape with a piece of stone and sand, and when finished, shining so brilliantly in the water that no bait was needed, the fish were allured by the sheen alone. For bigger fish a forked tree-root was chosen, and laboriously scraped with a piece of sharp shell into the needed shape, a lashing of fine coir, or hair-twine, being often added around the bend of the hook to give additional strength. With such hooks as these I have seen quite

large sharks caught, not, however, without the manifestation of great skill and patience on the part of the fishermen who, in their frail canoes, dared to try conclusions with these ravening monsters of the deep. Sometimes, but not often, a hook-shape stone was found, or a fragment that might with infinite patience be chipped into hook-shape; but these stone-hooks were never in much favour. Small harpoons, or fish-spears, tipped with sharp shells cut with barbs were also used, and even the children used to catch small fish in the shallows with tiny darts fabricated for them by fond parents. By such means did the Hawaiian natives secure for themelves an ample supply of fish wherewith to flavour their vegetable-food, and they at least could never have been accused of neglecting the plentiful supplies afforded them by the ocean.

Coming farther south, among the more thickly clustered groups of islands, we find the same careful attention paid to the wealth of the sea. Indeed, it would have been more than strange if it had not been so, seeing how, in the vicinity of all the islands, the waters teem with fish, even in the heart of the tropics. The procedure of fishing varies with the genius of the inhabitants, as might have been expected, but it all had a family resemblance, and with all of them there was the same readiness to eat the fish raw if fire was not easy to obtain, as in a canoe at a good distance from land; for these natives, unlike the Fuegians of Magellan's Straits, do not carry a fire in their canoes. But some, notably the Tahitians and Fijians, went to the length of weaving rude nets, with which they secured splendid hauls of fish occasionally; only, having no means of preserving their catch, they did

not care to make very great hauls, any more, that is, than could be eaten by the village mouths before putrefaction set in. Sometimes a whaler anchoring in one of their bays brought them joy by catching and towing near the beach a hump-backed whale, which, when denuded of its blubber and sent adrift, was eagerly pounced upon by the natives, and towed ashore where its bounteous store of flesh, resembling coarse beef, provided a royal feast for all the population. These occasions were dates to reckon from, for the food was to them delicious, and their own inventions of tackle stopped far short of anything sufficiently strong for catching the whales which swarmed at certain seasons among their isles.

I must here, before passing on to those wonderful lands where our kinsmen dwell, pause awhile to note two curious methods adopted by the natives of different groups for catching the fish they desired—methods wide as the poles asunder, yet reflecting the native mind and its adaptability to circumstances. In the Vavau group of the Friendly Isles, I once came upon an elderly native standing on the beach in the moonlight, hurling something as far as he could out into the sea and then hauling it back again. With that gracious courtesy which I always found among these amiable people, he allowed me to examine his gear. It consisted of a fairly long hand-spun coir-line, to which was attached a large pebble; around the pebble was hung a number of hooks. When this machine was flung into the sea, which was highly phosphorescent, the cuttle-fish abounding there sprang at it, and, becoming entangled in the hooks, were hauled ashore to furnish later a goodly feast for the

fisherman and his friends, for, as in the Apostolic days, all things in those isles were apparently held in common. In Noumea, New Caledonia, among natives far more primitive or less civilized, whichever epithet may be preferred, I saw the very antithesis of this curious plan. For some reason, which I could not fathom, the splendid fish of New Caledonia, as far as I could see, would not under any circumstances take, could not be cajoled into taking, a hook; so the natives used to procure, I do not know how, cartridges of dynamite which had the property of exploding as soon as they were flung into the water. Armed with a supply of these, a party of natives would sally out to the inshore side of the barrier reef, and, having assembled in what they considered a favourable spot, would hurl one or two cartridges into the smooth water. A tremendous explosion would follow, and when the agitated waters had resumed their calm, the surface would be seen strewn with the bodies of dead and stunned fish, which were picked up and flung into the bottoms of the canoes. In a very short time a full load of fish was thus procured, and the fishermen made the best of their way to market with their spoil. I could not ascertain how they used to capture those wily fish before they learned the properties of dynamite and were able to procure the powerful explosion; but I found that here alone, of all the out-of-the-way places I have visited in the South Seas, I was utterly unable to catch a single fish anywhere around the shores of the great island, although it seemed an ideal place for fishing.

Australia! how can I do justice to the plenitude

and amiability of your splendid fish! Everywhere I have sailed or steamed around the shores of that noble country, in or out of harbour, the story is the same, the most marvellous assortment of fish easy to be caught and of most delicious savour. But although a meal of fresh fish is fairly easy to obtain in the coast towns, I consider that Australia's fisheries are unaccountably neglected, even when it is remembered how plentiful, good, and cheap are all kinds of other food. What fishing there is has fallen mostly into the hands of industrious foreigners, as the lucrative business of market gardening is almost entirely carried on by the Chinese. Our kindred in Australia do not care to engage in any work that requires long and irregular hours and also precarious gains, or if driven by any pressure of circumstances to engage in such employment, they always relinquish it as soon as possible. So the fisheries are not at all exploited as they should be. Nature has been exceedingly kind to Australia in many ways, but in none more so, I think, than in the matter of food to be obtained from the sea. I can only say that here, as in other places I have noted, when the day comes that food is scanty on shore there will always be found an inexhaustible store awaiting the hungry ones, in the sea.

In one direction, however, the ocean's wealth is exploited on a portion of the Australian coast, fiercely and incessantly and by the aid of the very latest scientific appliances, that is, in the pearl fisheries of Western and Northern Australia. There is no lack of energy here, and no lack of reward either for the industrious, for although this pearl fishery cannot vie

with either the Manaar pearlery or that extraordinary one around the island of Margarita on the Spanish Main, there is no doubt that a vast number of beautiful pearls are here obtained, and owing to the immense appreciation in the value of pearls that has taken place of late years, there must be some very pretty fortunes to be made. There was a time, too, when Australia's bold seamen engaged in the whale fishery to a considerable extent; but that was long ago, and to-day I doubt whether anything in that direction is being done at all, either from Australia or the beautiful fruitful island of Tasmania, whose chief port, Hobart Town, was once the principal rendezvous of Australasian whaling ships.

I am glad that I have saved some superlatives for the last and best of our possessions in the south, the lovely colony of New Zealand. Because of all places in the world that I have been privileged to visit, this wonderland lies nearest my heart, for many reasons. But here I only deal with one of its phases of attraction; it is undoubtedly the sea-fisherman's paradise. If I were asked the question, which is so often put by one sailor to another, "Which is the best port you have ever been in for fishing?" I should unhesitatingly answer, "Auckland." Of course, such a question has a special meaning for a sailor, because, as a rule, he is confined to his ship, and if he cannot fish successfully over her rail he has no other opportunity. Now, in Auckland, whether the ship lies at the wharf or is anchored in the harbour does not matter, fish can always be caught. Of course, fish are not everywhere alike plentiful, because, for instance, in some portions of the beautiful bay fish are so thick that, on the

passage of a boat through them, the stroke of the oars will kill many. But fish are amazingly plentiful everywhere within the harbour, and correspondingly abundant outside all around the coasts. If it were necessary, I really believe that New Zealand alone could supply the world with fish, not, as in the case of the banks of Newfoundland, of one sort alone, or, as with us, where the only fish we get in such amazing numbers are the herring tribes and mackerel, but of so many varieties all of such high quality that the enumeration of them is quite bewildering. Two varieties of fish are found in New Zealand waters, which I firmly believe will successfully challenge all other fish in the world for supremacy in point of flavour. They are the "trumpeter" and the "frost-fish," to give them their trivial names, which are the only ones I know them by. But, indeed, there is such an embarrassment of riches, as regards fish, around New Zealand, as no other land can boast of, and I must, for fear of becoming tedious, leave it at that.

Another form of oceanic wealth in the shape of food is possessed by New Zealand in great abundance, oysters. They are small and irregular in shape, but of delicious flavour, and, owing to the absence of any polluting element such as sewage, free from any danger to the eater. But these succulent rock oysters only abound in the North Island. In the south, about Foveaux Straits, are found the bottom oysters, but not in any great quantities. New Zealand is also extremely rich in cetacea, especially in the largest sperm whales, which come closer to the shores here than to any other inhabited land known. The Solander

whaling-ground, at the entrance to Foveaux Straits, although really the smallest in area of any in the world, has long been known to whalemen as the most prolific in all the ocean. Its only drawback is the frequency and strength of its gales, for this part of New Zealand stretches well down into the stormy Southern Sea, and shares its wild weather. There is, however, a scheme on foot which, I believe, will be a great source of wealth to New Zealand—a plan for dealing with those magnificent visitors to the southern shores, and making the best possible use of them. It is, in short, a project for handling sperm whales as they are being handled in Newfoundland—by the aid of small specially built steamers, which will sally forth, and, capturing whales, will tow them in to the station, where every last ounce of their huge bodies will be utilized, and the waste that has hitherto attended all sperm-whaling operations be entirely avoided. This will, I feel sure, be a splendid addition to the resources of New Zealand, already great, for it will provide her with what she has hitherto had to import from other countries at great cost—the very best of manure for her farms at a low price. And in due time we may expect to see such fisheries extended to the outlying groups lying still farther to the south of New Zealand, the Macquarie, Campbell, and Auckland Islands, which are no less rich in whales than are the southern coasts of New Zealand, and have besides other visitors in the shape of the huge elephant seals.

With New Zealand I must conclude this hasty sketch of the ocean as a storehouse of food for the nations. It has been of necessity most cursory, as I did not wish to cover again the ground I traversed in

the "Creatures of the Sea," but only to give a few glimpses, as it were, into the vast larder of the ocean, and to show how trifling are the demands made upon it by the hungering peoples ashore. Dealt with exhaustively, this is a subject which, it is plain, would fill many volumes; but here my only object has been, as stated above, to bring into line, as it were, the aspect of our glorious heritage with those other no less interesting characteristics of the ocean as the great benefactor to the sons of men.

OCEAN, THE UNIVERSAL HIGHWAY

I

Ages ago, so far back that the doubtful chronology of those dim days can give us no definite idea as to when it was, some man made an involuntary voyage seaward from the shore of his native land. And when I say "involuntary," I wish to express his entire unwillingness and distaste for the making of the voyage. For him the land held all that his simple needs indicated—roots and fruits, and grubs and small succulent living things, the getting of which for the satisfying of his craving but primitive appetite was a very easy matter. His life was an easy one, containing just an occasional thrill when a big beast of prey came after him, a not unpleasant thrill either, for although there were disappearances of his friends and relatives to remember, he had the proud knowledge that he had on certain well-remembered occasions been able to outmanœuvre, to over-reach the grim monsters of the mysterious forests, and exultantly convert their huge carcases to his own uses. And these recollections bred in him a certain sense of superiority, of pride in achieving that made for a distinct advance in the long road of human progress.

Now, it does not in the least matter where this

country was; indeed, it is highly probable that no amount of painstaking exploration would now discover it, for the unstable earth may have long ago so changed her contour that its place knows it no more. It must be sufficient to say that it was either an island or part of a continent washed by the sea, whose waves constituted the terrific boundary between it and the unknown beyond. It has long been the fashion, or custom, to credit the Phœnicians, those hook-nosed Philistines of the farthest Mediterranean, with being the pioneers of seafaring, but that belief, like so many others we hold, may only be based upon the fact that our knowledge doesn't go any farther back. Really, when you come to think of it, there does not seem to be any reason why the ancient Egyptians, whose recorded history ante-dates that of the Phœnicians by a few thousand years, should not have been navigators, especially when one recognizes the intimate likeness between their works and physical characteristics to those of the aborigines of the American continent. Or, to go even farther back into the dim twilight of time, what about the Chinese? I hold in my hand a Chinese mariner's compass of quaint design and unknown antiquity, and, reflecting that the date of its invention by these immobile conservatives defies chronology, I am compelled to admit that it is quite likely that these incomprehensible, yellow people may have been navigating all the seas of all the world long anterior to the rise of that hoary mystery among nations—Egypt.

No, it does not now serve to credit those comparatively modern people, the Phœnicians, with being the pioneers of seafaring, simply because of their

connection with our islands, and the record of their maritime position in the pages of Holy Writ (Ezekiel xxvii.). They were a nautical and enterprising people, no doubt; but it is quite certain that they have no claim to having been in any sense the pioneers of seafaring. Not only so, but in their voyagings they were far less venturesome and enterprising than those earlier mariners of whom we have no records, save the indirect ones given by their works yet remaining to show what manner of people they were. Probably the earliest seafarers of whom we shall ever get any record were the Chinese, with their immemorial civilization, and the initative, which though they have now lost all trace of it, they certainly did once possess in a very marked degree. That they have not left their physical characteristics more definitely stamped upon the inhabitants of the far away lands, which they undoubtedly visited, may be plausibly explained by the fact that they were never colonists—that is, the Chinese of the maritime provinces were then, as now, merely trading pilgrims with an intense desire to return to their native soil when they had realized a modest competence. I have purposely mentioned the maritime provinces of China, because it is a matter beyond dispute that the Mongols did colonize Eastern Europe as the Huns, and that their facial peculiarities are faithfully reproduced there to this day.

But all speculations as to the place where seafaring may be said to have had its origin must be in the very nature of things based upon the shadowy foundation of guesswork. One solid fact, however, remains that somewhere upon ocean's borders, somewhere in the far back days of mankind's history, some

man more venturesome than his fellows balanced himself upon a floating log while bathing in the sea, and, with a sense of mingled terror and delight, found himself being carried along over the mysterious and unstable element. Doubtless, as the current gradually swept him seaward, and he became aware of the increased distance between himself and the land, terror dominated his feelings, but instead of paralyzing his energies it drove him to try and direct the course of his log by paddling with his hands. Not, of course, at first by breaking off a branch and using that as an oar, although I believe such great inventions did come at once by an intuitive flash, such as we may often see among animals who suddenly discover for themselves an improved way of doing things, which almost argues the possession of high reasoning powers.

Now, lest this preliminary supposition may appear far-fetched and improbable to some of my readers, let me say at once that as it is a well-known physiological fact that the whole history of the evolution of a type may be seen in the development of its embryo, so to-day the evolution of seafaring from its earliest inception may be witnessed by the observant traveller round the world. Even in so highly civilized a country as Hindostan the simple native of some parts of the coast may be seen seafaring under the most primitive conditions, only one stage, indeed, removed from the original floating tree-trunk. The fisherman of the Coromandel coast procures three rough logs, and lashes them together with yarn spun from cocoanut fibre, or, as we say at sea, seizes them together in three places. It is the first timid, tentative step towards shipbuilding; from it to the dug-out or canoe hollowed

from a log, either by fire or slow chipping, is a very long way. This rude craft is innocent of the most elementary equipment of a navigable vessel. The voyager just kneels upon it as near the middle as possible, with his legs wide apart, preserving a precarious balance. He propels his vessel with a paddle, upon which he has spent far more labour than upon the building of his vessel. Store of food or water he has none, but his rude outfit of fishing-tackle he puts in a roughly woven mat bag, which he secures to one of the seizings which holds his frail craft together.

Thus equipped he puts out to sea, and, greatly daring, ventures right off the land until he can hardly discern it, in search of the primal need of mankind—food. How he manages to endure the constant strain of keeping upright, the incessant wash of the seas over him, the fierce heat of the sun, and the privation of food and drink, is a mystery; but the fact remains that he does. Of course the constant wetting does in some measure prevent the fiercer pangs of thirst, for it is a well-known fact that thirst can be alleviated at sea by pouring sea-water over the body. He is the primitive seafarer, almost at the beginning of things nautical, but yet far removed from the pioneer on the floating log who first discovered how easy a road the sea made from one place to another. Necessarily the range of these primitive craft was very limited, except under extraordinary conditions, presupposing as much suffering as the human frame is capable of enduring. Yet we have had proofs of involuntary journeys having been made in the South Pacific from one island to another in craft almost as primitive as those which I have described, by natives who have

survived the terrible ordeal, and made their permanent home in the land to which they had come for the best of all reasons—they couldn't get away any more. Yet from such beginnings as these, the outcome of pure accident, the art of navigation had its rise, although among most of the nations it never reached a scientific stage. Aboriginal navigation in its most advanced stages may be witnessed to-day in Polynesia, on the Indian and African coasts, and very often the elaborate construction of the vessels, by the most primitive of tools, compels admiration; but as far as the navigation of the deep sea is concerned, they have stood still for more thousands of years than any one can reckon. But they hold fast to the great discovery that journeying by sea has many great advantages over travelling by land, not the least of which was that it was universal territory, that given means of propulsion and guidance, both of which were far easier of attainment at sea than ashore, long journeys might be made far more expeditiously by sea than by land. There was also far less chance of meeting with hostile forces prepared to dispute the passing of travellers, and ready to take from them, if strong enough, all that they possessed, including their lives, or, what was much more precious, their liberty.

This discovery of the ocean as a universal highway was, perhaps, the greatest factor in the making of history of which we have any record. Once it had gained firm hold upon the minds of men the development of navigable craft was bound to follow, no matter how long the period of evolution might be. The initial step had been taken, the mysterious terrors of the unknown expanse of waters had been met and

overcome, and thenceforward all the embryo mariners' energies might be devoted to producing navigable craft, and finding out means whereby they might be successfully piloted from a given spot to a desired haven. Undoubtedly most of the earliest voyages were accomplished involuntarily; accident determined their departure and their arrival. And how many perished on these forced passages from one land to another will never be known, nor does it matter; pioneers were ever martyrs, unconsciously sacrificing themselves for the benefit of those who should follow them. But it must have been a very long time, even in the leisurely history of the early world, before any definite rules of navigation were formulated. The building of seaworthy vessels, within which some degree of safety might be expected—comfort did not come for thousands of years; in fact comfort, as we understand it, is probably a word that, if it existed, had no real meaning until the last century, and at sea certainly was meaningless until fifty years ago. I am sure there could have been little to choose between the condition of the passengers in the ship of Adramyttium in which Paul made his memorable voyage, and that of the emigrants in a Black Ball liner of fifty years ago, as far as comfort went. But as what we never know we never miss, these early navigators were not conscious of their want, and just endured all the evils of the flesh incidental to their voyages with philosophic calm or callous indifference, as the case might be, knowing that they were probably far better off than if travelling by land. I remember once, amid the horrors of a pilgrim ship, asking a grave Arab whether he would not rather have made the journey

by camel if it had been possible. I was much surprised by his answer that, compared with the desert journey, this easeful progress was akin to being already in Paradise. Now, I had thought that the condition of those pilgrims more closely approximated to the antipodes of Paradise; but, of course, much depends upon the point of view.

For a very long time we cannot speak more definitely than that, and it does not really matter, the followers of that first involuntary navigator did not get beyond his initial mode of propulsion. Paddles or oars were the only means whereby the hollowed logs could be moved along. And here, again, progress must have been hindered for centuries, awaiting the coming of the inventor of sails. Since labour might be had for the taking, wh[illegible] easier than to impress a crew of fellow-savages, giv[illegible] the necessary power, and make them paddle or row? I wonder how many oarsmen, leisurely propelling their boats with a beauteous lady-love at the stern pretending to steer, spend a thought over the fact that they are indulging in almost the earliest form of marine propulsion; that what they are doing was done by the most primitive seafarers, and that the oar for ages remained the only way of getting a ship along? Doubtless the sail came when some genius, having lost all, or nearly all, his rowers, noticed that the wind was pushing his vessel along, and was suddenly struck with the idea of sticking the unused oars up on end with the flats of their blades disposed so as to catch the wind. From that to sails was a comparatively short step, determined only by the ease or difficulty of getting material whereof sails might be made.

But here, again, it is demonstrable that for some hidden reason or another the earliest discoverers of the value of the ocean as a common easy road, and the inventors of the means whereby they might expeditiously get their vessel along, it having reached a given point in their progress, stuck there, and never went any farther. So we may see them to-day. The Chinese, probably the earliest navigators and inventors of means to navigation, are now at the same point as regards the rig and equipment of their vessels as they were in the dim days before the dawn of history. The Coromandel native, having evolved his three-log catamaran from the floating tree, no one knows how many centuries or even millenniums ago, still sticks to it, unable, apparently, to devise any improvement. Even among peoples who are such near neighbours as the various islanders of Polynesia, it is curious to note how in one group there will be many types of canoe, all pathetically showing limping progress from the tree-trunk, but none getting past the rudimentary, experimental stage, while in another group you shall find elaborately evolved vessels, with decks and cabins, with careful arrangements to secure stability, much ornamentation for the delight of the eyes, and, above all, scientifically constructed masts, sails, and rigging, every detail of which demonstrates a high grade of inventive genius and constructive skill, also of no mean order, especially remembering the immense difficulties in the way of such people producing these appliances out of their exceedingly limited and primitive stock of materials. But great as their progress undoubtedly must have been for a time, it reached a limit far below that of seaworthiness

at a very early date, and there it has remained ever since.

This applies to all the early seafarers, and gives almost certainly to the theory that the colonization of parts of the earth by people separated from them by oceans must have been by accident, since their ships were never fitted for undertaking lengthy voyages, and, indeed, were usually of such a low grade of seaworthiness, or so small, that it needed no little courage on the part of the seafarers to creep in them from headland to headland, or cross narrow stretches of sea without losing sight of land. But, in the nature of things, such frail and hardly navigable craft must now and then have been blown off the land and carried away by wind and current for long distances, sometimes reaching far-distant shores with some at least of the crew or passengers still alive.

There is only one exception to this rule, one difficulty in applying it universally, and that is the almost absolute certainty that parts of America were colonized by the early Egyptians. The records they have left behind them, in the shape of buildings covered by inscriptions which are almost identical with those recently discovered in Egypt, antedating the pyramids by a few thousands of years, are all on the western side of the continent, showing that these highly cultured visitors came from the East. But since there is a sharply defined limit to human endurance, which would be reached in a case of drifting many months before the vast stretches of ocean between the eastern shores of Africa and the west coast of America had been crossed, we must admit that there is good ground for supposing that these old

Egyptians sailed with deliberate intention eastward—ever eastward. Their undoubted astronomical knowledge would enable them to direct their course by the heavenly bodies, albeit without the compass it would be very roughly made. And as their way would be beset by islands after passing Hindostan, which they probably would do without touching these, they would, after crossing the great stretch of the Indian Ocean, make what we should call a coasting voyage of it for nearly three thousand miles before emerging upon the vast open Pacific, with its stretch of seven thousand miles, to the shores of the great American continent. That part of their voyage confronts us with the profoundest mystery of all; but we know it was made, and must be content with that knowledge.

Such stupendous journeys for these ancient mariners must, however, have been the great exception to the rule of coasting necessarily followed by early navigators, and nothing can well be more certain than that for many centuries after the first discovery of the possibility of using the ocean as a toll-free road it remained in all its wider breadths in utter solitude, as far as man was concerned. It was to no sense a universal highway, and, indeed, even for the timid coastal navigation that was carried on, only men of the highest courage and enterprise, as well as skill and adaptability to entirely new sets of conditions, were available. Such men were, pre-eminently, to be found among the Phœnicians of Tyre and Sidon, who probably obtained their seafaring bent from the Egyptians; but whereas the latter did their marine business along the shores of the Red Sea, and crept down the African coast probably as far south as Natal,

the Phœnicians made the great Middle Sea peculiarly their own, and did indeed realize its value as a means of communication between all the most important countries of the then civilized world. But it was a long time, owing doubtless to their hazy notions of the terrors that lay beyond, before they ventured to pass the pillars of Hercules and entrust their frail craft to the mighty waves of the Atlantic. The spirit of exploration, however, was peculiarly theirs, and in due time they ventured, little by little, keeping, we may be sure, very close to the land all the while, as far as Britain. And I do not think it at all fanciful to suppose that they did then sow the seed that should so long afterwards bear such wonderful fruit. I should also be inclined to give them the credit, too, of having inoculated the Portuguese and Spaniards with their own strong desire to roam over the sea, enduring all the trials and dangers which that roaming entailed, for the sake of the amazingly rich rewards that were occasionally gained, but more especially for the gratification of that love of wandering into the unknown, which is one of the strongest instincts of mankind.

There is yet another important item to the credit of the Phœnicians, which must on no account be omitted. They sought the sea-road as peaceful traders, carrying the wares for which their manufactures were famous to barter for the desirable commodities of other countries. They were neither pirates (for piracy had not then been invented) nor restless adventurers, bent on aggression wherever they were strong enough. It is true that for the motive-power of their vessels they used slaves, and in so doing inflicted cruelties upon

helpless human beings, which we have to shudder at; but it was reserved for seafarers of a later day and a boasted higher civilization to use the galley-slave in war, and war, too, without any other excuse than that of greed. Yes, the maritime polity of the Tyrians and Sidonians was essentially a peaceful one, and if their religion was one of dark and bloody cruelty, we ought not to forget that they used the sea with a due sense of its proper relation to mankind, as a means of beneficial intercourse between the nations, and not as a truly infernal battle-ground.

For many generations it would appear that they enjoyed a practical monopoly of our sea-trading, so that it was no figure of speech to say of the Prince of Tyre that the waters made him great. Indeed, we have the best evidence to prove that they were the teachers of the other nations whose territories bordered the great Middle Sea, and, as has so often happened since, long after the Greeks and the Romans had established a navy, it was to the Phœnicians and their descendants, the Carthaginians, that the new-comers had to look for captains, officers, and pilots. But long before the more northern nations had become fully alive to the advantages of sea-traffic for the purposes of commerce, they had with characteristic blood-thirstiness seen what a tremendous power it gave them for the furtherance of their schemes of conquest. And one of the first uses that the Romans, at any rate, made of their sea-power was to destroy the nation that had educated them in the use of it. In doing this they left a lesson for Britain which is like the hand-writing on the wall, but which, alas! we do not seem able to interpret or even to read. It is that a maritime

power, which has grown to be entirely dependent upon its own sea-trade for its existence, cannot afford to be contemptuously indifferent to the rise and progress of other nations in sea-power that are not dependent upon the food brought oversea for their daily bread. And also that the possession of great wealth without the energy to fight for the protection of that wealth, and with the belief that money will make up for the loss of national manhood is a fatal delusion, and one that surely presages the downfall of the nation bemused by it.

After the fall of the Carthaginians, the use of the sea (I cannot yet say the ocean, since navigation was principally confined to the Mediterranean as yet) became degraded to fighting purposes almost exclusively. It is true that Rome, following the bad example of Carthage, began to neglect her own resources because of the comparative ease with which she could be fed by means of her ships from Egypt, the granary of the ancient world. But the bad precedent of sea-fighting had been fairly established, and there was now no such thing as a peaceful trading vessel. Every seafarer had, of necessity, to sail prepared at any hour to meet with another vessel which would certainly plunder him if able, and which he would certainly plunder if strong enough. Even if they bore the same insignia, or were even under the same ownership, the fact of their being at sea seemed to render them Ishmaels of the most pronounced type. In consequence of this, seafaring had degenerated into piracy —it is quite safe to say that every seafarer of the Middle Sea was a pirate, given opportunity.

But, meanwhile, the hardy barbarians of the

inhospitable North had taken to seafaring—apparently had been driven to it by the necessity of finding the subsistence which their hyperborean home denied them. The rugged shores of Scandinavia and Denmark bred an ideal race of seafarers—children of the storm, the mist, and the frost. Hard as their native rocks, turbulent as the waves that foamed upon their barren shores, they formed an amazing contrast to the men of the South, who wilted under the biting blasts of winter, and thought shudderingly of the land of the Cimmerians, which lay in the mysterious North, as beyond the endurance of flesh and blood. How or when the northmen first conceived the idea of sailing the sea-road, of seeking in softer lands through no matter what trials, the much-desired luxuries denied them by the land of their birth, we do not know, for even their own sagas are silent. But, once having taken to the sea, even though their ships were but cockleshells, they seem to have been at home; the wave and the tempest had no terrors for them, and in a spirit of comradeship entirely foreign to the Roman idea of the difference between patrician and pleb, or legionary and galley-slave, they face with cheerfulness and alacrity all the terrors of the Northern Sea.

Still, their advent marked no advance in civilization, but the reverse. Before very long the native of any shore within their reach (and their reach grew more and more comprehensive every year) grew to look upon the sea as an easy inlet for the most terrible dangers to him and his. It was no longer a barrier between him and the outer world, contact with which he dreaded, but an open road, along which might come at any hour of the day or night, the ships of the

northern pirates, their crews unswayed by any such modern notions as mercy, justice, kindness, or fair play. Such was the terror they inspired, that it was only by making their descent upon any place a complete surprise that they could compass any success in their undertakings with the smallest notice of their coming; the inhabitants disappeared inland, bearing with them the most easily portable and precious of their possessions. In case of a surprise, the story was always the same—indiscriminate slaughter for awhile, then selection of the fairest of the women, then fantastic cruelty to the few prisoners reserved for that purpose, wild debauchery, and departure with the plunder.

Yet, in spite of their piracy, and of the manner in which, owing to the terror they inspired, there was no possibility of any growth of peaceful trading among the people who inhabited the Southern European shores, they undoubtedly did good work in extending the ocean range of seafaring. Regardless of privation, greedy of adventure, and apparently impervious to cold, they gradually crept across the North Atlantic in their frail craft until, centuries before Columbus or Amerigo Vespucci were born, they discovered the mainland of America. But they were not colonists; their only ideas were warfare and plunder, and so America remained a *terra incognita*, waiting its due time. The Vikings, meanwhile, returning to their land without plunder, but full of stories of adventure, turned their attention entirely to the rich lands of the South, with what result we know. Proving as doughty warriors by land as they had been invincible by sea, they overran Europe, overthrowing the existing

civilizations which had become effete and utterly vile, and substituting for the emasculated Roman rule their own savage virility.

But still the sea called them, and leaving the luxurious life of the land behind them, they pressed on to the eastward, overrunning the waters of the Mediterranean until they had visited all those countries where the navigation of the Middle Sea had its origin. It cannot be supposed that in so doing they did not occasionally find traces of the nautical prowess of their predecessors, and even some of their degenerate descendants feebly endeavouring to maintain an intermittent traffic. Such trembling mariners met with the usual fate at their hands. All strangers were enemies, and the only mercy that any enemies could hope for at the hands of those fierce corsairs was speedy death. The granting of life was always on such terms as made death a boon to be craved for with intensest desire, but it was seldom granted unless the supplicant were useless either for toil or sport.

So the uncounted years rolled on until, inoculated with the sea-roving instinct by those hardy, ruthless sea-warriors, the coast-dwellers on the shores they had visited began almost simultaneously to seek their fortunes on the seas. Unhappily, the day of peaceful trading had gone with the Phœnicians, and was not to return until quite modern times; no man dare hope to go unmolested upon his lawful occasions at sea; every sail sighted was a possible and probable enemy, and only the ship that was well manned and well armed might hope to escape, not unmolested, but uncaptured or undestroyed. Yet the trading instinct, once having been aroused, and the [illegible]

the successful voyagers having been bruited among their countrymen, no danger of capture or destruction at the hands of ruthless pirates sufficed to deter the eager voyagers; nor, when we come to think of it, was this attitude of mind unreasonable. Men, who had braced themselves to meet the thousand dangers of an unknown ocean, to whom navigation, as we understand it, was but a series of guesses, and the principal component of whose enterprises was hope, could hardly be deterred by the remote possibility of meeting with pirates; it was a risk not to be compared with those they met daily and nightly, without any preparation, to be considered at all adequate for the unequal conflict.

Contemporary with the rise and progress of seafaring on the seas of Europe, the Arabs, on the other side of Africa, had discovered that the sea afforded for them, too, a comparatively easy road to power and wealth. The narrow but deep waters of the Red Sea and Persian Gulf afforded men an admirable learning-ground, having settled weather, deep water, and skies always free from cloud. By reason of this latter advantage, indeed, they became expert navigators, for to them had descended the ancient astronomical wisdom of the Chaldeans, supplemented and reinforced by their own researches and improvements in mathematical knowledge. When and where among them the mariner's compass first appeared, the one instrument wanting to complete their equipment for ocean navigation, is uncertain; but my own belief is that they either met on one of their roaming voyages to the East with a Chinese junk, part of the plunder of which would certainly be a compass, or that they

penetrated to China itself, and there found the wonderful thing that, in more capable hands than those of the ossified scions of its inventors, was destined to be the means of opening up the whole navigable world.

Whatever the means, they certainly obtained a compass, and speedily learned its use, so that they became, for the time, quite expert navigators; indeed, they were the pioneers of that science, a proof of which is afforded by the Arabic names given to the stars even now in use, and the indispensable almanack. And had their skill in shipbuilding or instrument-making been commensurate with their courage and learning, it is difficult, indeed, to see why they, and not Europeans, should now have been the carriers of the world; but, like the Chinese, having reached a certain point in their development of seafaring, they halted, and could go no farther. For one thing, their perfect fatalism, with its inevitable excuse for laziness, stood in the way of their advance beyond a certain point. What, for instance, could be more fatal to any progress, in a business point of the view, than their practice, followed to-day as it was in those far-off times, of lowering the anchor down a few fathoms on the approach of night, furling the sail, and turning in, all hands of them satisfied with the knowledge that, before their vessel could strike upon any shore, she must be brought up by her anchor? or, if that did not happen, and she became a wreck—well, it was so to be, and no amount of exertion or watchfulness on their part could have possibly prevented it.

Thus, although they undoubtedly did mankind a great service in extending the science of seafaring so as to take in the great ocean roads, they, in their turn,

having reached a given point, remained there till this day. But if they remained stationary, the wisdom they had shown became available for nimbler minds; and when Europeans once obtained it, their energy and perseverance opened up the way for the great era of sea-traffic, which we seem to be at the apex of to-day. That, however, must form the subject of the next article, this one being already over-long.

OCEAN, THE UNIVERSAL HIGHWAY

II

WHAT we may call the modern era of seafaring began in the Mediterranean, when the highly organized Arabian powers, flushed with their success in warfare against every nation they had met in Asia and Africa, turned their attention to Europe. As already noted in the last article, they had become the first sea-power in the world, and now, in the tenth century A.D., they began to establish a naval domination of the Middle Sea as a preliminary to the conquest of Europe. Quite rapidly for those days, Saracenic vessels began to ravage the European coasts, and compelled a consolidation of the newly risen civilizations of Italy and the survivors of the ancient Greeks, who had become, at least, nominally Christian, to bestir themselves in order to avoid being annihilated by the fierce Eastern corsairs. Some sort of intermittent traffic was carried on, whereby the rich products of the East found their way into Europe, and the Italians and Greeks, ready learners, managed to gain from their fierce visitors some of their seafaring lore. The Greeks and Romans had, of course, long been carrying on their semi-piratical seafaring, but it had been conducted in primitive fashion as regards navigation. Their mariners were

expert coasting sailors, but when out of sight of land were helpless from lack of the mathematical and astronomical knowledge which was a monopoly of the Arabs.

When, however, these latter fierce seamen began to invade Europe their sea-lore soon became common property, with the result that the Mediterranean became the great cockpit wherein the struggle for supremacy between East and West was waged for centuries. The energetic and astute Italians excelled in the new art, and although each petty republic, Pisa, Genoa, Venice, fought steadily for their own aggrandisement, careless apparently whether it was against each other or the infidel, it was against the Arab that they always combined whenever they did do so. Even then they did not scruple to enlist the Moor or Arab whenever possible, having the greatest respect for his courage and ability, and the position of Othello must have been quite a common one among the Italian republics of the Middle Ages.

Yet, in spite of the almost incessant internecine strife, in spite of the ever-present necessity of waging war against the infidel, there was a vast amount of traffic carried on, and the argosies of the Italian republics gradually pushed on until they passed into the dreaded Atlantic and brought their wares to Britain, now by constant intercourse with France and Scandinavia becoming ripe for a commerce of her own. The Moorish invasion of Spain and Portugal had also imbued these valiant descendants of the old Roman colonists and the aboriginal inhabitants with the desire of seeking new outlets for trade and conquest over-sea; and so it came about that, even in the throes of

emancipation from the awful scourge of the Arab invasion of Europe and the counter-invasion of Asia by the Crusaders, sea-traffic gradually grew and extended its ancient limits until in the fulness of time Columbus, the Genoese, set sail from Spain to find India by going westward, and Bartholomew Diaz sailed southward for the unknown limit of the great African continent. It was as if weary of the incessant clash of arms, the futile slaughter of each other on land, men turned wearily for relief to the great mysterious ocean in the hope that there they should find the room for peace which was denied them on land.

Thus it came about that, groping almost blindly in the mysterious ocean solitudes, Italians, Spaniards, and Portuguese rediscovered America and India, and laid the foundation of the inter-ocean traffic which we see to-day. Still, their voyaging was quite timid and tentative, for the advance in the science of navigation had not kept pace with the courage and enterprise of the navigators. But one great step had been taken, perhaps the greatest possible—one, at any rate, that more than compensated for lack of navigational knowledge. It was that men had lost their fear of the ocean. They no longer dreaded sailing over the edge of the world into space, or into a region of darkness from whence there could be no return. They had become so far familiar with those apparently illimitable breadths that they put forth in all confidence that they would *fetch* somewhere or another, and that, wherever it might be, it would be well worth visiting and annexing, for, after all, conquest and subsequent gain was the root motive of these voyages.

In this way did Spain and Portugal become the proud possessors of the fairest and wealthiest portions of the world, and through the enterprise and daring of their mariners, coupled, of course, with almost incredible suffering, wealth incalculable poured into the homelands, and did its demoralizing work. The minds of all men were fixed upon these strange new regions oversea, from whence flowed in a golden stream such abundance of treasure as intoxicated the intellect, and made the steady cultivation of home industries seem too paltry for consideration. Every argosy that put forth appeared to those remaining behind as the germ of a golden harvest, the dreadful toil, the sacrifice of life, and the entire uncertainty attendant upon every venture being quite forgotten. The ocean was indeed becoming not merely the universal highway, but the royal road to wealth beyond man's wildest desires.

But meanwhile in the north of Europe there were two little nations, at that time hardly considered worth reckoning with, who were steadily acquiring sea-lore also—Britain and Holland, both informed with the spirit of the ancient Vikings, and both being driven by their poverty on land to seek participation in the spoils of which they had heard such glowing reports. It is a common platitude that history repeats itself, and here the truth of the saying was made abundantly manifest, for as the Greeks and Romans of old hired the Phœnician mariners to rear their naval forces, and the Italians made use of the Moorish navigators, so did the British and Dutch hire the Italians and Portuguese seamen to educate them in this grand new way of becoming wealthy. It must

have been a quaint experience for both parties to such bargains. On one side, the stolid, unemotional, but freedom-loving Dutchman or Briton, without dash or initiative, but possessed of that invaluable quality, perseverance; on the other, the vivacious Italian, keen as a rapier, bubbling over with intelligence and receptivity, but so mercurial that he was continually alternating between the heights of hope and the depths of despair. There was also undoubtedly much friction because of the impossibility of the Italian master or pilot to comprehend the essential difference between the slaves he had been in the habit of commanding and these sturdy freedom lovers, who, although they did submit themselves to savage punishments, insisted that those punishments should be legal, and those laws assented to by themselves. Still more must the Italian mariners have been surprised at the wonderful way in which the British islanders and Dutch lowlanders assimilated the teaching they received and improved upon it until their teachers were fain to confess that their pupils were outstripping them in a marvellous fashion.

Now, it is a moot point whether in such wondrous enterprises as the opening up of new worlds, or of new forms of government, it is better to be the pioneer or the vanguard of the main army. There is always, of course, an intensely human desire to be first in the field, to skim the cream off the venture, as it were; but history teaches us that it is but rarely that the pioneers in any national enterprise have eventually profited much thereby. But in the present case it really must have seemed to both Britons and Dutchmen, imbued, of course, with the hazy notions of the

age as to the size of the unknown world, as if the Spaniards and Portuguese had got so far ahead of them that they could only expect leavings, and, of course, they could form no estimate of what those leavings were likely to consist. In any case, however, the traffic with neighbouring countries needed development, for there was a growing demand everywhere for the commodities that some other country produced which in no other way could be so cheaply and easily procured as by sea. What has puzzled many, though, is the slow and curious development of marine architecture. Of course, all evolution is from the simple to the complex, but in the case of ships, that complexity should indeed have, in modern times, been entirely confined to the interior equipment of the vessel. We are really now in the twentieth century, with our finest ships, not far removed from the model favoured by the Vikings in their long ships, or, to go still farther back, to the Phœnicians with their galleys. Yet in this period, when all ocean secrets were yielding themselves passively to mariners of sufficient daring to seek them out, a curious degradation of marine construction set in—a sort of recrudescence of barbaric display without regard to efficiency, such as may even now be witnessed on the Irrawaddi, or among some of the more remote South Sea Islands.

Underwater the general contour of the vessels remained the same, but their upper works began to show a burden of fantastic ornamentation which we should have thought would have struck a practical seaman even in that early day as cumbrous, out of place, and, above all, dangerous in the extreme by reason of its making the vessels crank, or top-heavy.

Moreover, another vicious development took place which was bad in every way, and yet possessed such a fascination for those early ship-constructors that they persevered in it until they had made many of their craft entirely unseaworthy. I allude to the extraordinary camber they gave their craft. A slight curve downward to the waist, from bow and stern, seems to a seaman an absolute necessity in every ship; he cannot imagine a hogged ship, *i.e.* one that rises instead of sinks in the middle as seaworthy, to say nothing of being beautiful. But these early ships were made to sag so much that while in the waist their deck-line was almost awash at the bow and stern, especially the stern, it rose until it seemed almost a miracle that they could stand upright at all. It is a problem I have often discussed with modern seamen, how in the name of common sense did those extraordinary craft keep right way up, and how with that enormous after-erection holding the wind did they ever manage to steer? We always gave it up after coming to the conclusion that their seamanship must have been of a superlative order, and their patience far exceeding that of the Patriarch of Uz, to handle those vessels at all. That they ever did or could tack or beat to windward appears so eminently impossible that we always dismissed the idea as not worth discussing.

Another matter that seems puzzling, but may be explainable on the ground of want of means, is why, after deep-sea voyaging had become the vogue, the size of the vessels which were appointed to that service did not more speedily increase. People ashore may not take much notice of the fact, but to sailors of our

day it is a never-ceasing wonder what great voyages were undertaken by vessels which to-day we hardly feel justified in allowing out of a river or an estuary. Occasionally a small craft like Captain Slocum's *Spray*, of twelve tons measurement, does make a voyage round the world or across some of its stormiest oceans, but it can never be gainsaid that long voyages in small crafts mean the maximum of privation with the minimum of usefulness. Of course, many of the adventurers had high hearts but low means, and, like schoolboys of to-day, thought that if they could only get a boat—something floatable—they would in some haphazard fashion find their way to the other side of the round world. That, of course, was an entirely proper spirit, and one that carried its possessors far; but what we must quarrel with these old seamen for is the way in which they allowed the shipbuilders to overload even these tiny crafts with top-hamper, not of masts and sails, but of solidly-built upper works, as if at sea the ordinary laws governing stability were reversed. Yet, I don't know. As I write these words my mind's eye pictures some of the old buildings in England and Holland, whose upper stories bulge out so amazingly as to make us feel sure that unless they were supported by the neighbouring edifices, the first blast of wind must topple them over. But, then, this topheaviness is carried to an extraordinary length in Moorish or Saracenic dwellings, and it does not seem to have affected their shipbuilding in the same manner.

Enough; in spite of the severe handicap placed upon them by the smallness and build of their ships, Spain and Portugal had led the way in ocean traffic

until, Spain on the west and Portugal on the east, they seemed as if they had divided the remaining world between them. Talk as we may of the degeneracy of the modern Latins, we ought never to forget that to do what they did in the discovery or rediscovery of those far-away lands by means of ocean traffic exhibited some of the very highest qualities of the human race, with the exception of justice and mercy or any form of altruism whatever. It should also be remembered that the commanders of those ships were entirely dominated by the idea that they were of the chosen ones of earth, and those whom they commanded born only to serve them. The idea is not yet extinct, but it is doomed. In their case it served to energize them, to carry them high above all such trivial obstacles as hunger or thirst or insubordination. They believed in themselves almost as gods, and the unlimited power over the persons of their crews; the utter absence of any check upon them when once they had left home for the unknown, could not but foster and confirm that belief.

Another incentive which they had in their voyaging was undoubtedly the very powerful one of religion. Their belief in themselves was buttressed by their absolute certainty that they were divinely commissioned to carry the banner of the Cross all over the world and propagate their religion in much the same manner and with quite as much ruthlessness as their Saracenic predecessors had done, and their Moorish contemporaries were even then doing; for while they were intensely religious, their religion was of the fanatical type, which entirely separates theory from practice, even to the amazing extent of spreading the

Gospel of Peace by murder, rapine, and torture. Of their seamanship little can be said. We do not know much of the polity of those vessels except that the seaman was looked upon as a base mechanical slave, whose duty it was to take the ship wherever the leader willed, that leader being generally entirely ignorant of seamanship or navigation, and dependent upon his pilot or sailing-master for those essentials to making a voyage. It would seem to be a very poor way indeed of making a success of seafaring, but where time was no object and the ascendency of the aristocratic leaders of an expedition over their men was so complete, it answered well enough. And, moreover, it must be remembered that at first there was no opposition or competition; the pioneers of those world-encircling voyages had the vast stretches of ocean entirely to themselves.

That fifteenth century, however, was the era of vast changes for the whole world, as far as the varied Governments and peoples were concerned. The ocean became at last in very deed the universal highway, became so, in fact, almost with a bound after the voyage of Columbus and the Portuguese opening up of India. But it is fairly certain that if it had not been for the advent of Britain and Holland, with their more energetic seamen and their far more business-like ideas, the progress of ocean communication would have made very little headway indeed. It would almost certainly have died out again from sheer lack of energy to carry it on, history repeating itself as in the case of the early Arab or earlier Chinese navigators. The two Northern powers, however, hearing of the great spoils to be won overseas, and impelled to seek

a share in them, partly by their ordinary human desires of gain and partly by the dynamic force exerted upon them by their ungenial climates, now appeared on the scene, and very soon made it manifest that if they were late in the field they did not intend to allow that fact to cramp their operations. The Dutch, as if a compact had been made by them with the English to divide the watery world between them, started on the track of the Portuguese, and in their thorough methodical but slow way pressed on around the Cape and into the far Eastern seas. Theirs, however, was a far more peaceful cutting into the discoveries of their predecessors than that developed by the English. For one thing, there was an enormously varied and extended area open to their operations, and, either by accident or design, or a combination of both, they hardly encroached upon the Portuguese discoveries in Hindostan and Africa at all; but, going farther east, opened up the amazingly rich islands of the East Indian archipelago. With quiet persistence they established themselves among those mysterious isles, and set about enriching the mother-land from thence, not in the splendid unstable fashion of the Spaniards, who traded in gold, silver, pearls, and precious stones, and scorned the humbler commodities of life, but in spices, valuable woods, fabrics, and fibres—a far more sure if a much slower means of adding to the national wealth.

The English, on the other hand, retaining as they did many of the piratical instincts of their Viking ancestors, and fired by the reports of incalculable wealth being acquired by the Spaniards, did not attempt to make any discoveries of their own, but

boldly sailed in the Spaniards' tracks, and demanded a share in the gains of *their* discoveries. It was entirely outside morality, business or otherwise; it could not be called war, since the two nations were ostensibly at peace; and it was not frankly piratical, being justified by the aggressors on religious grounds. I have called the English "aggressors," although the term seems rather far-fetched, remembering the enormous disproportion between the two countries in favour of Spain. But I think the term is correct; we were the aggressors, whatever justification for our aggression we might have put forward.

Still, it was an unmoral age. The rules of conduct which govern us to-day, not perfectly, but to a very great extent, were then extant but entirely ignored, and men of all the nominally Christian nations did things without a qualm that we to-day should characterize as the blackest of crimes, and turned from the commission of those acts to the performance of religious duties with an air of perfect innocence. Even then, so queerly constituted is the human mind, men made excuses for their deeds, found all sorts of strange justifications for them, so that even the horrible slave trade was carried on by Englishmen with as little compunction as if they had been rovers of Sallee. And in this spirit the English sea-rovers began the informal war with Spain by following in the tracks of her argosies, noting the ports to which they sailed, lying in wait for them when returning laden with spoil, and conscientiously robbing the robbers—for the Spaniards were nothing better than robbers and murderers of the very worst type, albeit they committed their crimes with a high-bred

nonchalance that made them almost seem like legitimate acts of commerce.

Still, steadily, persistently, the opening up of the highways of Ocean crept on. The science of navigation did not keep pace with the enterprise of the adventurers, but considerable knowledge of prevalent winds and currents was obtained coincidently with much local acquaintance with the various coasts. It may fairly well be doubted whether the astronomical calculations were made with anything like the same exactness as they were by the old Arab *nakhodás* or shipmasters; but what the English, Dutch, Spanish, or Portuguese mariners lacked in accuracy, they made up for in enterprise and energy. But, even with them, "hurry" was a word that had no place in the nautical vocabulary. Having crawled into a region of winds or currents favourable for their destination, they allowed their vessels to drift or jog along in sublime disregard of the passing of the days; for they had no worrying owners pursuing them with telegraphic instructions, no fears of losing freight, no trouble of any kind with those left behind, they had enough to bother them in the scurvy and the keeping of unruly but sorely-suffering crews in order. All the while, though, progress was being made in the science of navigation, however slow, and charts of the oceans were being laboriously compiled and continually added to by the mariners who had cultivated the art of cartography. If we remember, as we should do, what the accommodation was like in those vessels, how crude were all the appliances for the prosecution of so delicate a work as marine surveying is, and how entirely absent was any form of comfort, we must look

upon those old sea-worthies with the greatest admiration for the work they did in laying the foundation of our gigantic oversea trade. It has to be remembered, too, how small the vessels were, how overmanned and hampered with the necessary armament to enable them either to defend themselves or to attack a weaker vessel that offered plunder. We shall not be able to restrain our praise of the simple old pirates who did such wonderful work under such adverse conditions.

Still the ocean was, like the desert, a hunting-ground for the descendants of Ishmael. Pretexts for attacking, plundering, and destroying ships of another nation were always forthcoming, and the only improvement that could be noticed was that it was seldom that ships bearing the same flag attacked one another. There was no regular navy anywhere now, for the old Italian maritime republics had fallen upon evil days, and could no longer boast of their thousands of merchant vessels and their scores of war galleys to protect them. Every ship now was man-of-war or peaceful trader, as the occasion arose; but it was a prime necessity for any seaman that he should know how to fight for the safety of his ship. If he did not, or could not, there was an end of him and his crew, and his owner's gains, for there was no such thing as insurance or protection by vessels exclusively equipped for war.

Again, it is obvious that these old seamen are entitled to our unstinted admiration in that they accomplished what they did in development of ocean traffic when the odds against them were so heavy. Not only were they handicapped in the passing of those vast ocean solitudes by the puerile size and equipment of their

vessels, the question of provisioning, which even to-day, as far as seamen are concerned, still remains a burning one, and the advance in astronomical knowledge was not all commensurate with the eager desire of mariners to push forward to the innermost recesses of old Ocean. And as to instruments, to mention them only raises a smile of pity. The cross-staff for measuring the sun's altitude and the compass made up the sum of their scientific implements, so that they could only hope to obtain an approximately correct latitude; and as for longitude that was, and continued to be for many generations, a matter of pure guess work. There were no charts, at least none worthy of the name, for the science of cartography had not yet been born, and in consequence it was only possible to proceed when near land (and they had to watch the sea and the birds very carefully to know whether they were near land or not) with the utmost timidity and caution. Yet all unconsciously they were adding to the sum of navigational knowledge, building up very slowly but very securely the great fabric that should afterwards prove to men, of no special force of character and only moderate intellectual ability, an almost royal road to seafaring.

Progress, of course, was continually hindered by war. Ever eager to embrace any means whereby they might rob and murder one another more easily, men found that the ocean lent itself with peculiar ease to these satanic developments of humanity, and in consequence the beneficent side of ocean traffic was continually hindered by the infernal practice of merchant seamen preying upon one another, and recognizing no law upon the sea but the primitive

one of the ability of the strongest to do what he felt inclined to.

So by the opening of the sixteenth century ocean traffic had become almost a commonplace, and while much discovery remained to be accomplished, the main high-roads of all the oceans were now wide open, mariners had grown accustomed to the idea of sailing across the ocean, and thought little of the safe accomplishment of a voyage from Europe to any of the other great divisions of the globe. By the expression "wide-open" I mean to point out that the element of mystery, breeding dread of the unknown, had departed, and, given time, any seaman worth counting as such had no qualms in undertaking a voyage to any part of the world accessible to a ship.

Now, with the wonderful development of all-ocean traffic came a problem to be solved. Was this new, immense adjunct to national prosperity to become the monopoly of any one nation, or was it to be, as it obviously should be, according to the dictates of humanity, free to the enterprise of all for the common good of all men? Spain, fretted and galled beyond endurance by the semi-piratical raids of the English, determined that one formidable competitor, at any rate, should be effectually silenced. And the Invincible Armada was the result of that determination, its fate a matter of history, upon which there is no need to dwell. Terrific as the struggle and the subsequent exhaustion was for both sides, there is no controversy as to the position in which its conclusion left England. It did not ruin Spain, she had ruined herself in much the same manner as Russia has done in her conflict with Japan. But England had found herself, and realized that her

future greatness lay in her development of sea-power, and that she must be prepared to assert that greatness at all costs, to sacrifice all her internal necessities, if need be, to this one paramount idea—that she must be the mistress of the seas. This was not so much formulated as felt, and that universally, with the result that English sea-power rose steadily, and her flag was carried by the Elizabethan mariners to the remotest corners of the earth. The nation had found its proper vogue, and being convinced that it could not only hold its own, but grow as fast as it would, became a veritable driving force in the affairs of the whole world.

Now, since the days of the Greeks, Romans, and Italian republics, there had been no division of any country's vessels into warships on one side, and merchant ships or trading vessels exclusively on the other. The vessels that fought in the supreme struggle of the Armada were armed merchantmen, and hence the conditions were quite different to those, say, at the battles of Platea or Actium, where the vessels engaged were built and handled for warlike purposes only. The only alteration that was made in the ordinary merchantman in preparation for a great sea-fight was in the extra ammunition that was put on board and the reinforcement of the crew by soldiers. This latter was in itself a hindrance to naval development, for the military, ever a haughty caste, looked down upon the seafarers as mere mechanics, only useful to bring the ship into such a position as would enable the soldiers to do the fighting, which bred all manner of heart-burnings and jealousies, and made progress difficult.

Gradually it became evident to Englishmen that

if her trade was to grow in its natural ratio, merchant seamen must have their hands free from the necessity for fighting, the ships themselves must not be hampered by warlike equipment, that peaceful trade must be protected by vessels built and fitted out for war. In short, that England must have a navy to protect her already great commerce from molestation by the ships of other nations, as well as by the pirates sailing under the flag of universal hatred and depredation; for going to sea in those days was an extremely hazardous undertaking, more so, perhaps, than at any other time in the world's history. As before noted, the development of all aids to safe and speedy navigation had by no means kept pace with the courage and enterprise of seafarers generally; and, in addition to the clumsiness of the vessels and the horrible privations in the matter of food and water and lodgment, there was now the fierce and lawless competition between all the maritime nations, so that the sighting of a sail was the signal to prepare for action, to make ready to fight not merely for liberty, but for life.

Spain, however, had been permanently crippled; Portugal was fast sinking into a slothful negligence from her brief and brilliant sea career; France was not yet of much account on the sea, and the only two nations who were contemporaneously growing in sea-power and skill were England and Holland. They seemed as if they were going to share the world between them, or else, in case of a national quarrel, that one would be practically destroyed, leaving the other paramount. England had done Holland an enormous service in breaking the sea-power of Spain to pieces, for Spain had been the relentless tyrant of the Dutch,

the whole of whose manhood had been exerted for many years in order to retain the leave to exist, in defiance to the relentlessness of Spain for their destruction. But there is no such thing as national gratitude, as Britain has abundantly proved, and so it gradually became evident that if England did not crush the sea-power of Holland, the opposite would certainly happen. Both nations strained every nerve to equip themselves for maritime warfare, building warships and training fighting seamen in preparation for the coming struggle.

It came to a climax, as we know, in the middle of the seventeenth century, when England, writhing in the throes of civil war, was also compelled to fight for her existence as a maritime power. The time was entirely propitious for Holland, but the dark hour produced men who rose to the full height of that great occasion, and after many a severe struggle England emerged triumphant, mistress of the sea. It is true that during the shameful reign of the Second Charles we slipped back for a time into a condition so helpless that had there been any concentrated effort on the part of our foreign foes we must then have sunk into a state of such absolute helplessness at sea that we should probably never have recovered from it. As it was, the Dutch, who had been so effectually crushed during Cromwell's rule, recovered to such an extent that a fleet of theirs entered the Thames and inflicted terrible damage upon the hapless merchantmen; but they were not able to pursue their advantage, and the danger passed away.

Thenceforward the sea-power of England increased amazingly. Science and exploration went hand in

hand, and even the almost incessant warfare in which we were engaged at sea, as well as on land, only seemed to have the effect of increasing our oversea trade and of fixing our maritime supremacy. When at last, from the growth of right-mindedness among civilized peoples, over-sea trade came under the operation of law, piracy was crushed and peaceful merchant mariners were free to devote all their energies to combating the inevitable perils of the sea, the only serious competitor we found was the young giant of our own breeding, driven by acts of superlative stupidity to turn against us and become almost implacably inimical. Within the memory of men still living, the oversea trade of the United States of America was almost equal to that of Great Britain, and any observer of the trend of maritime affairs might have been forgiven for prophesying that by the present day the great Republic would have been the chief maritime power in the world.

That, however, was not to be. Various causes, with which we have nothing to do, put an effectual stop to the growing sea-power of the United States, and not only restored Britain to her proud pre-eminence among maritime powers, but made that pre-eminence far greater than ever. Chief among these was the advent of steam and the utilization of steel for shipbuilding. Since these two great factors in maritime intercourse have made their appearance, navigational science has kept pace with their development, until to-day the ocean has become so universal a highway that the average man thinks less of a journey to the Antipodes than his grandfather did of a stage-coach trip from London to Edinburgh, and

certainly with reason, for more discomfort and real hardship would be endured on the latter trip than on half a dozen modern voyages to New Zealand.

I feel I cannot do better in concluding this chapter than point out that, while we still easily hold our own against all the rest of the world put together, there are not wanting signs that our position as the chief users of the great highway which we have done so much to make universal, and in the policing of which, in order that all peaceful mariners may come and go unmolested, we have spent such countless millions of treasure and such an enormous number of lives, will soon be seriously challenged. Germany and Japan are undoubtedly going to put us on our mettle in this direction. And there need be no war. Just the steady pressure of efficiency and economy, combined with a determination to employ their own citizens, will undoubtedly carry them very far, even if they are not quite able to wrest from us our supremacy as the greatest of all the powers who do business on the sea.

THE OCEAN, UNEXPLORED AND UNEXPLORABLE

At first sight the title of this chapter may raise a spirit of contradiction in the mind of the thoughtful reader, who may well be forgiven for saying, "What part of the ocean yet remains to be explored? Has not man traversed every sea open to the passage of a vessel, and surveyed it too, so that we may buy for a few shillings charts of the entire surface of the watery world?" Quite true; but I speak of that unimaginably vast portion of the earth's surface which is hidden by the ocean, into which the questing eye of man can never penetrate, from which he is, and must be for ever excluded, the depths of the sea. There is no danger of giving offence to veteran oceanographers, such as Sir John Murray and Sir Wyville Thomson, by such a statement as this, for they, with the true modesty which always marks your real scientist, would be the first to admit that, in spite of the labours of themselves and others, the marvels of the ocean-bed and of the vast intermediate spaces of ocean between its surface and its bottom still remain as mysterious as ever.

The depths of the sea! The very phrase savours of mystery, is as full of uncanny suggestions as is the world of spirits to some minds. To think that in

these ultra-scientific days of ours there should be so vast a portion of our globe as unknowable as space itself, a very world peopled by the strangest forms of life existing under the most extraordinary conditions of pressure, lack of light and air, conceivable by us, is enough to give the least imaginative mind among us something to dwell upon with awe; for it has no parallel on the dry land or in the air. Above a very thin film of atmosphere terrestrial life must cease, below an equally thin stratum of earth it is the same, but in the ocean's depth we know that life everywhere abounds, even in abysses which would submerge Kinchinjanga or Aconcagua. From these profound depths the trawls of the *Challenger* have drawn strange forms of life, but there has always been a feeling that these may not have come from the greatest depths; and, in any case, when we remember the enormous area of the ocean and the tiny space covered by the ship, we must at once feel how trivial must be the knowledge gained by the most unremitting industry of exploration. All our speculations as to the nature of those gloomy profundities seem to fall lamentably short of the possibilities of mysterious life abounding there, and after dwelling upon them for a space the mind recoils, baffled from the attempt to imagine what the depths of the ocean must be like. We may, however, dwell with a certain complacency upon what man has accomplished in spite of the difficulties attendant upon deep-sea exploration, chief among which is the truly wonderful feat of laying the submarine cables. First of all, the careful laying off of a line of deep-sea soundings from continent to continent, so that a rough idea of the contour of the ocean-bed might be gained,

then the careful laying of the cable among the sea-bed with all its irregularities, so that the strain of its being stretched from one submerged mountain peak to another should not be too great for its strength; and, lastly, the perfect protection of the cable against the corroding influence of the sea-water. Sufficient recognition has, I fear, never been accorded to the work of the cable-layers, to those quiet men, unknown outside of their own circle, who so nonchalantly steam out into the great waste of ocean, and unerringly pick up the end of a broken cable from these inscrutable depths, buoy it, and go off and pick up the other end. The subsequent work of reuniting those ends is comparatively easy, a mere matter of mechanics,—wonderful enough, of course, to the great majority of people who have never considered the mechanical difficulties in the way, but, compared with the spectacle of the dot of a ship pausing at the exact spot in the illimitable ocean to drop a grappling down six or seven thousand feet and pick up a thread from the bottom, as simple as the alphabet to a reader.

In these days of mathematical and engineering wonders we take too much for granted, using the amazing marvels of science without a thought of the "how it is done," of the nameless unknown toilers who have conspired to make life easy for us, who have dared to enchain the lightning from the clouds and bid it run through the bowels of the earth or along the sea-bed to carry our messages for comfort of gain; but I know that our appreciation of these marvels would be far greater and our enjoyment of life itself be enhanced wondrously if we would but consider the

labours of those by whose energies these ameliorations of our lot are made possible. It is not as if such knowledge was hard to gain, superficially at any rate. There are always with us a host of willing scribes to make plain to us the labours of the workers; but, alas for us, the unutterable balderdash of low fiction, the impossibilities of most of the modern novels, are more to our taste, and, like the foolish dog, we reject the substance for the flickering shadow, to our own exceeding detriment.

All this, however, is but by way of preliminary, a lengthy introduction to my subject. If we glance at a chart of the North Atlantic Ocean we shall see a series of irregular curves drawn along the lines of soundings which have been obtained, partly by the indefatigable labours of the surveyors for cable-laying purposes, but more, much more by the work of the various scientific expeditions which have been sent out to examine as far as could be possible the irregularities of the ocean bed. And it will at once become evident to us how rough an approximation to the truth these curves represent. Of course when near the various shores the lines of soundings become very accurate, having been fairly easily obtained owing to their shallowness, and the nature of the bottom carefully noted as an all-important guide to the mariner. But soon after leaving the land these easy depths suddenly become abysses, descending precipice-like from five or six hundred feet to as many thousands, or, as in the Bay of Biscay, to three times as many. For there it will be seen that the submarine cable is stretched across an abyss whose sides descend abruptly from a depth of less than a thousand to one of from twelve to

eighteen thousand feet, the distance from the one brink of this awful chasm to the other being less than a hundred miles. It is impossible to imagine a cable bridging so vast a gulf in air without intermediate support, say from Chimborazo to Cotopaxi, since no cable would bear the strain. Yet such is the sustaining power of the water that it is most probable that the cable through which our Southern messages are flashed from Scilly viâ Gibraltar does bridge that mighty gulf, and that, too, without undue strain. No such sudden irregularity is encountered by the Transatlantic cables. They lie fairly close to each other over an irregular plateau, varying in depth from the surface from six thousand to fifteen thousand feet, but not abruptly. And the deepest soundings yet made in this, the best-measured ocean in the world, reaches nearly twenty-eight thousand feet, from which abysmal pit rises almost sheer the mountains whose summits form the Antilles.

But what is the character of those vast depths? Here comes the justification for calling the depths of the ocean unexplored and unexplorable. From the ships of scientific expeditions trawls have descended into these inscrutable depths thousands of times, but the sum-total of the spoil they have brought to the surface is infinitesimal, and certainly in nowise representative of the abundant mysteries beneath. If only the drag-nets of the *Challenger* could have brought to the surface some sculptured fragment of the lost Atlantis, some recognizable sign of an immemorial civilization submerged by some unrecorded cosmic upheaval, what a discovery it would have been! But no, apart from a few eerie forms of alien life, of bizarre

fish, the sole gain from the bottom of the deep sea has been a few bucketfuls of ooze, rich, indeed, in organic remains of globigerina, diatoms, and foraminifera, but bearing no relation to the works of man. Another similar fact, exemplifying the infinitesimal spots which would-be exploration has been able to reach: out of all the thousands of wrecks, of ships foundered in the deep sea, no portion, not the least fragment, has ever been recovered by the searching drag-nets of exploring ships.

There is another phase of the ocean depths which appeals to the imaginative mind very strongly, the steady set of submarine currents, the enormous flow of what, for a better name, we must call submarine rivers, carrying with them who knows what of influence upon the shores against which they will presently impinge. I cannot dwell too much upon this aspect of the submarine world, having already alluded to it sufficiently in a previous chapter upon currents, but it demands a passing mention here in connection with the title, because if we only knew, with any approach to accuracy, in what direction these unseen currents were trending, what was their origin or cause, and what their effect upon the upper world, many problems of weather and navigation which are at present insoluble would become comparatively easy of elucidation. At present we must content ourselves with the meagre knowledge that these mysterious movements of the lower waters of the ocean, like the incessant flow and return of the currents of the human frame, keep the globe in health, such constant circulation of the whole mighty mass of ocean's body being essential to the avoidance of stagnation and death, death not

only of the myriad tribes inhabiting the sea, but of the millions of higher creation on the land.

And knowing this, we need not be too much troubled about our ignorance of the proximate causes of these great motions, whether changes of surface-temperature, or gales, or cosmic upheavals, or the ceaseless revolution of the earth upon its axis; we must be content to know that these currents exist, and that their action is wholly beneficent in its operation for the well-being of the globe. Of one thing we may be certain, from the very best of evidence, which is, that the ocean is a vast laboratory for the manufacture of those often invisible matters which make for health, as well as being the great deodorizing receptacle for all the filth of the world. It is true that mother Earth also deodorizes, changing the foulest forms of refuse into wholesome food, but she does it at a terrible price, and the process is most disagreeable under the best conditions; whereas, in the vast bosom of the ocean, this cleansing, health-renewing process goes on continually, perfectly; and those whose life is spent upon the sea surface or near its shores know full well what an elixir of life is continually ascending from its limpid waters.

Now, in the foregoing, I have assuredly no wish to belittle the wonderful work done by the *Challenger* expedition and kindred efforts. They have accomplished an amazing amount of work, and have added largely to our sum of scientific knowledge by even the blind gropings that they have been able to make in a few spots scattered over the vast ocean bed. For one thing, they have dispelled several old and well-worn fallacies connected with the depths of the ocean,

principal among which was, that below a certain depth, say, a thousand feet, life ceased owing to the enormous pressure of the superincumbent weight of water and the absence of air, to name only two reasons which used to be advanced. They have discovered, also, the extreme mobility of the ocean; in the language of the late hydrographer, Sir W. Wharton, "not one drop of all that vast mass of water is ever for a moment at rest,"—that is, in the popular sense of motion, and taking no account of the high scientific fact, recently discovered, of the incessant activity of the electrons of which all matter is composed. They have learned a great deal of the contour of the sea-bed, and plumbed its greatest depths in the South Pacific, or at least approximately so to a few yards, an awful abyss just north of New Zealand, with a profundity of six miles. The only other portions of the ocean bed, which nearly approach this stupendous depth, are all fairly close to land: as the deep near Hayti, in the West Indies, 28,000 feet; the trough off the Japanese coast, of about the same depth; and a hole, between the Marianne and Caroline islands, in the North-Western Pacific, of over 27,000 feet.

Now harking back to the Atlantic again, the explorers have by diligent survey discovered, in the midst of the southern half of that vast and almost landless expanse of water, what they call a ridge, or, rather, a submerged continent, larger than the whole of Scandinavia, which rises from adjacent depths of from fifteen to eighteen thousand feet, to a mean height of about seven thousand feet, leaving its top still some ten thousand feet below the sea surface except at its extremities, where the lonely peaks of Ascension, St.

Helena, Tristan d'Acunha, and Gough Islands soar into the upper air. Possibly at some period of the wondrous early history of our globe this great ridge was above water, dividing the South Atlantic sheer in two, with such effect upon the climate of that ancient world as we can now hardly imagine; but owing to our utter inability to penetrate the mysteries of those inscrutable depths, we have no means of knowing whether this was so or not. We may, however, reasoning from the known to the unknown, feel fairly certain that there is but little difference really between the land above and the land below the sea, except in those attributes which the former has gained from its contact with the atmosphere and sunlight.

Among the most potent forces at work in the depths of the sea must be the volcanic upheavals, some of which having taken place near land have given evidence of their terrible effects. Arguing from our knowledge of the fact that the deeper we go down from the Earth's surface the nearer we approach to the incandescent core of our world, it would seem only reasonable to suppose that at a depth of about ten times that of the deepest mine ever bored by man there must be but a comparatively thin skin between the sea-bed and molten conditions. Consequently, where in the course of the planet's cooling that skin cracks, and the astounding mass of water at the freezing point rushes in upon that glowing reservoir, the upheaval caused by the sudden conversion of so many millions of tons of water into steam would be sufficient, one would think, to rend off whole continents from the submerged surface, and to change its whole contour in a way which we dry land-dwellers can only dimly

imagine. I am fully persuaded in my own mind that the bed of the sea is the breeding place of earthquakes, and that the reason of their being so much more prevalent in some parts of the world than in others must be looked for in the fact that the gigantic concussions consequent upon these submarine explosions take certain given directions laid down for them by the geological configuration of the earth; for it is well known that the harder the substance the greater the effect of an explosion upon it, and the farther reaching its effects. But in any case so great is the concussion that its effects may be observed all over the world, although in many places quite delicate instruments must be used, known as seismometers, in order to note and record the tremors of the earth.

Another reason why earthquakes are more prevalent in some places than others is, I suppose, that in such places there are usually vent-holes for the subterranean fires which, presumably from the lie of the strata beneath the volcano, come much nearer to the surface in these places than in others, and consequently the pent-up volume of steam, taking the line of least resistance, rushes towards these outlets, shattering the intervening rocks in its way. I consider it to be a striking confirmation of this theory, that all terrestrial active volcanoes are near the sea; and the extinct ones in places remote from the margin of the ocean appear as if by the intervention of some cosmic upheaval they had been thus isolated from the element which had been the proximate cause of their elevation. And therefore the same remarks which I have ventured to make as to the cause of earthquakes will apply with equal force to volcanoes, which, I take it, are in most

cases just safety-valves, and this I think may be considered as proved by the presence in all volcanic eruptions of vast quantities of boiling mud and steam, as well as the more terrific floods of molten rock known as lava. To digress for a moment, it may be said that such a wonderful exhibition of volcanic action as is shown in the Yellowstone Park cannot be due to the sea, because of its remoteness. In that case, I think the upheavals may be referred to the penetration into subterranean fires of rivers flowing down from the mountain chains, and so is to be considered as due to the action of water after all.

I am suddenly reminded that hitherto I have been able to refer continually to the beneficent action of our heritage the sea upon the earth, but that in this case it is difficult indeed to see where the benefit to mankind comes in, what good can be wrought by these terribly devastating phenomena. But while admitting the difficulty, I am not prepared to say that earthquakes and volcanic eruptions are wholly evil in their effect upon the life of the world at large, or that the unascertained good may not largely overtop the easily understood evil. It may be that only our ignorance of the great cosmic scheme prevents us from seeing the good that is being done, and for my part I am content to believe that all these mighty forces have their mission which makes for ultimate good. Certainly the amount of destruction done which we can assess is appalling, apart altogether from the widespread cessation of life in the sea itself as a consequence of these cataclysms. In some of them, at any rate, the area of absolute death must be measured by many thousands of square miles, yet, taking place as it does

in that unexplorable region into which man is forbidden to penetrate, we know nothing about it; nor does it cause, except in a very small degree, and in only a few places, even inconvenience to mankind by the loss of the fisheries. For such is the recuperative and revivifying power of the sea, that these gigantic destructions do not leave traces of their power for any length of time that is appreciable, the teeming life of the ocean asserts its tenant-rights again at the earliest possible moment, and all is as it was before the catastrophe.

Still, it must be gratefully admitted that certain parts of the sea-bed, and notably those where such paroxysms of our planet would cause the greatest possible amount of suffering and loss to man, are remarkably free from these terrific visitations. I have often thought of the possible effect of a submarine upheaval beneath the banks of Newfoundland, for instance, or indeed anywhere within the extra-tropical regions of the North Atlantic. We need not, however, speculate upon these palpable possibilities, but be humbly thankful that they do not occur.

And now, leaving the Atlantic for awhile, let us take a brief glance at the Indian Ocean. The principal feature of the Indian Ocean bed, until we get away east to the Archipelago, is the absence of volcanoes and the presence of the coral reef. Not, however, in any great numbers; these wonderful evidences of animal activity in secreting from the water the solid material of which the dry land is made are not, so to speak, very abundant. I passed them over when they occurred in the North Atlantic, or, to speak more particularly, in the Caribbean Sea and Gulf of Mexico,

because I wished to deal with them as a whole. In the face of the acute controversies which have taken place between great authorities upon the subject of coral reefs, it would be impertinent of me to intrude any personal opinions of my own. But one thing is certainly most clearly established, which is, that as the madrepore or millepore, or, to use a more popular and therefore incorrect term, the coral insect dies when it reaches the surface, so it is unable to exist below a certain depth of only a few fathoms. Therefore the fanciful idea of these tiny builders toiling through the ages in order to erect their babel towers from the remote ocean depths until they reach the surface to form islands must, however reluctantly, be abandoned. Where it has been found that coral persists to a great depth, it has also been found that it *is* dead coral; that is, the tiny builders have succumbed upon the sinking of the basement or foundations of their erection—a settlement in all probability due to the shrinkage of the earth from cooling, before alluded to. But where the coral structures have been found to exist well above high-water mark, it must be presumed that they have been lifted thither by some subterranean upheaval as rapid in its action as the sinking before mentioned had been slow.

The main feature, however, about the coral formations which strikes the imaginative mind is the manner in which each of these tiny globules of jelly, in whom only the microscope can enable us to observe any of the organs we usually associate with constructive life, labour incessantly to abstract from the sea as it flows past them the particles of lime necessary to

construct their fairy-like dwellings; how, infinitesimal as they are, the aggregate result of their toil is enormous, comparing to easiest advantage with the most stupendous works of man; how, too, all this labour is directed by some supreme intelligence into the most beautiful structural forms, comparable only with the most delicate tracery of leaf and blossom in the vegetable world. Here alone may be found the most satisfying food for thought that the most ardent mind could desire, even if the privilege of viewing these marvels *in situ* has been denied. The actual contemplation of them breeds awe and reverence and a fuller appreciation of the wonders of the mighty deep than any previous and dissimilar acquaintance with those wonders would have appeared to make possible. Enjoying as I do most keenly the works of Nature observers, such as Richard Jefferies, Charles G. D. Harper, Richard Kearton, and others, I am bound to say that an even richer field awaits the enthusiast who shall devote a year or two to close and constant study of the work of the denizens of a coral reef, and write of them and their labours in the same spirit of loving appreciation, based upon close observation, as the writers already mentioned have done.

Leaving for a while the coral islands of the Indian Ocean, let us take a flying glance at that wonderful broken series of volcanic lands which border this ocean on the east. They are, of all the earth's surface, the most closely allied to the great cosmic changes that are occurring in our age, being honeycombed with volcanic outlets, and subject to the most appalling manifestations of subterranean energy. One of the

most terrible of these outbreaks occurred in 1883, at Krakatoa, in the Straits of Sunda between Java and Sumatra, on the direct highway to the Far East. Perhaps because of the spread of observatories all over the world the universal character of this cataclysm was noted all round the globe, proving how tremendous was its effect upon the atmosphere. An atmospheric wave of the most marked character recorded itself upon every barograph in the world for three successive days, and the sky presented for weeks, to masses of wondering awestricken spectators, the most marvellous blends of lurid colours at sunset and sunrise, owing to the presence in the higher strata of the atmosphere of incalculable quantities of volcanic dust. But of the world-wide effect of the submarine concussion we know little. Its local effects transcended all previous experience, mention having been made of waves one hundred feet high recoiling landward, and inundating in a few moments many hundreds of square miles. But enough has probably been said of this particular destructive form of ocean's activity, and I gladly pass on to the great Pacific, which is in some respects peculiarly distinct from the Atlantic.

First, in that it does not owe anything for its banks in the north to what has been considered the prime factor in forming, for instance, the great bank of Newfoundland, viz., the gradual melting of southern drifting icebergs laden with detritus from the Arctic lands, which has been deposited in this favourable position during the course of ages. For the only way into the Pacific Ocean from the Arctic is through Behrings Straits, which are much too shallow to permit the passage of any piece of ice large enough to be

called a berg, since the submerged portion of an iceberg, owing to the slight difference between the specific gravity of ice and water, is about eight times as deep as that appearing above water is high. One valuable result from this is that the navigation of the North Pacific is not impeded by the presence of these wandering dangers, which constitute the most terrible of all mid-ocean perils for the seafarer. Another great peculiarity of the Pacific is the vast number of scattered island groups, nearly all of which are mainly of coral, although the evidences of submarine volcanic energy are very frequent, the appearance or disappearance of islets in a day being of such frequent occurrence as to constitute a considerable danger in navigating those intricate waters.

It is notable, too, for its immensely greater average depth than that of the other oceans, although, knowing what we do of the immense depths that have been discovered within comparatively small areas surrounded by much shallower waters, it is far too much to say that even the great deeps that have been plumbed are the deepest that will be found. Many years of incessant labour in deep-sea sounding, even with the present splendid instruments used for that purpose, must elapse before we are in a position to say we know exactly how deep the ocean is, if, indeed, we ever do know. Besides, it must be remembered that this is a scientific question, not a commercial one at all, a depth sufficient to float the biggest ship we can build, with a fair margin over so that the heaviest seas may not break, being amply sufficient for all navigational purposes.

Yes, the Pacific, besides being the most vast in

area, and the deepest, is unique in many respects; but, although it has been traversed for centuries, although it probably bore upon its broad bosom the earliest of all navigators, and has, being the wonder sea of the whole world, a magnetic power of attraction for all who still love the romance of the sea, it has not yet nearly come to its own. That, however, is in the near future. With the rise of Japan into a first-class power, with all the maritime qualifications necessary to enable her to take advantage of her magnificent position, with the cutting of the Panama Canal and the development of the Australasian colonies, the next generation or so will most probably witness an amazing development of Trans-Pacific trade, in which it is most probable that our country will have to struggle fiercely to hold her own with America, our own colonies, and Japan. But that great development will come gradually, and it is to be hoped that our ancient energy in shipping matters will be equal to the occasion.

And now, in considering the most mysterious ocean of all, the boundless Antarctic, we come to a portion of the surface of the globe that, both above and below, is full of mystery. A few attempts have been made on scientific grounds to explore it, and a century ago a certain amount of romantic business, in the shape of sealing upon its few barren islands, was carried on, while great fleets of sailing vessels, bound from Britain to her antipodean colonies, and home again round Cape Horn, gave the northern portion of it a fairly strong human interest. But the sealers have long given up their stormy trade, the sailing ship is fast disappearing, and, except for the swift passage of the big ocean steamships that still use this route, the great

Southern Ocean would have almost relapsed into its primitive loneliness and silence. It was always a strenuous ocean, where only the best of ships and the boldest of mariners could hope to hold their own, and its passage has ever been calculated to show the stuff that ships and men were made of. Steam in this, as in so many other departments of seafaring, has wrought a marvellous change, so much so, that what old sailors know as running the Easting down, will probably soon be a thing of the past.

But, whether it relapses into its primitive deserted condition or no, there is one phase of beneficent activity which it will never lose, and one that has a vast and incalculable effect upon many millions of the human race. Its cold waters, studded with mighty icebergs from the mysterious Southern region, where life apparently cannot exist except in the sea, are continually rushing northwards to supply the immense and continual evaporation of the heated waters of the tropical oceans, so that there is nothing extremely fanciful in supposing that a nodule of ice from the vicinity of Mount Erebus may, converted into rain, be found nourishing a wheat ear in the fields of the Doab, or that the rain for which the patient ryot is waiting, in almost utter hopelessness, is coming to him from that far-off region of which he had never heard, and for which he has certainly never cared. And thus the four great oceans, by reason of their wonderful system of circulation, are mutually interdependent, and co-operate in their great work for the benefit of mankind.

THE OCEAN AS A BATTLE-FIELD

In spite of the admiration and affection I feel—I hope in common with all other Britons—for the British Navy and its glorious history, it is, I confess, with the greatest possible reluctance that I approach this portion of my subject. War in any form is, to my thinking, a horrible, bestial thing, and its exercise indicates that the people who commence it are lost to all the higher feelings of humanity, unless, indeed, they are driven to take up arms as a last resource in order to save themselves and those dear to them from slavery, in which case the onus rests upon the aggressor, although he may not have actually committed the initial act of war. But dreadful as war is anywhere, it will surely be admitted that it is pre-eminently so upon the sea. Man's conquest of the sea as a highway for commercial purposes has been and remains one of the crowning achievements of humanity; that he should calmly pursue his avocation upon this treacherous and foreign element sets the seal upon his position in creation. But that he should degrade this magnificent triumph of mind over matter to the shameful purposes of subjugating, despoiling, and slaying his fellow man is to afford an object-lesson of the most striking kind of the heights to which man can soar and the depths to which he will drag himself

by the aid of those very qualities which place him at the summit of the scale of creation.

Not, of course, that I would dare deny even to a pirate the possession of heroical qualities. To do so, indeed, would be foolish; for it must be obvious that the mariner who is also a fighter is doubly a hero, and it must never be forgotten that every naval engagement has in it the nature of a forlorn hope. Way of retreat for the defeated there is none, except for those whose courage fails them early in the fight, and who manage to flee before any material damage has been inflicted upon them. But here, again, I feel the deepest sorrow that the possession of such qualities should be so perverted, and that the beneficent ocean should be for even the briefest hour polluted by the slaughter of one another by men. Let me hasten, however, to add, for fear of misunderstanding, that this view of the ocean as a battle-field does not in the least affect my admiration for the British Navy and its splendid men. In spite of what foreign liars may say, ay and even our own home-bred traitors declare, every right-thinking, intelligent Briton knows that in the fullest sense of the word the motto of the British Navy is "Defence not Defiance." It is more than that, it is the police of the world, the chief, almost the only, agent for making the navigation of the most difficult waters secure; its one end and aim is that the peace of the world shall be kept, and that all men, specially mariners, under whatever flag, shall be free to go and come between the lands in pursuance of their lawful occasions. Moreover, feeling assured, as I should do were I a native of any other country, that the existence of Britain as a nation is,

under God, a prime necessity for the advancement and well-being of the whole world, and being equally certain that her prosperity and power has excited the fiercest envy and cupidity on the part of other nations, which it is unnecessary to specify, I look upon the might of her navy as the only safeguard against the evil desires of those nations, which, if they only could possibly compass the destruction of that safeguard, would be immediately exercised with the utmost ruthlessness for the purpose of reducing her to a condition of helpless vassalage to them. This, of course, will be looked upon as a prime example of British hypocrisy; but even those who will call it so know, however distasteful the knowledge may be to them, that it is within the bounds of the strictest statement of fact.

So much by way of introduction, and now we must make a long leap backwards into the twilight of time. The same difficulty of finding a basis of fact for our remarks besets the subject in hand as was noted in the chapters on the "Ocean as a Universal Highway," viz. that the records we have of the doings of the early maritime peoples are very scanty, and vitiated by fable, while of the exploits of others, whom we feel certain had their share in early nautical enterprise, such as the Chinese, we have practically no record at all, fabulous or otherwise. It seems certain, however, that the same essentially nautical people whom we have agreed to regard as pioneers of European nautical commerce, whatever may have happened before their days in the Far East, the Phœnicians, were also the earliest sea-warriors. That, I think, would naturally follow, because there would undoubtedly be among them reckless men who would be tempted to take a

short cut to wealth by robbing one another (for there were no other seafarers to rob); and because, having committed this crime, they dared not return to Tyre, they would establish piratical colonies in suitable ports on the shores of the Mediterranean. This led to the honest merchantmen arming themselves against the pirates—a simple matter enough; since in those days there was not, there could not be, such a thing as peaceful trading, the merchant must be a fighter if he would keep what he had honestly gotten. For the primal instinct of man is to take what he covets, and, if resisted, to fight like any other animal, the reign of law not having yet begun. This, of course, applies to those early maritime traders whom I have called *honest*, for there can be no doubt whatever that, while they bought commodities when they were unable to obtain them in any other way, they never scrupled to take what they coveted without payment when they were strong enough to do so. And this applies especially to that, in those days, most marketable of all commodities—man.

Consequently, it was no long time after the birth of navigation before there was developed a regular system of sea-warfare; but it is as well to note that, at first, it was a warfare conducted by mariners alone without the aid of land soldiers. Fighting as a profession, distinct from the useful peaceful avocations of mankind, had long been practised, and, indeed, had reached to a high pitch of efficiency, as of course it should have done, being, as far as we can learn from history, the principal occupation of the more advanced of the nations. I point this out because it is a curious fact that for many centuries of naval, or, rather,

nautical history, it seems to have been considered absolutely necessary to carry soldiers on board ship to do the fighting; but we shall presently see that they became slaves, and nothing else. The early Phœnician mariners did their own fighting as well as navigation, and consequently attained a high proficiency in the art; indeed, for centuries they held a monopoly of all that pertained to navigation.

The first instance on record, however, of their being employed in any great nautical warlike expedition was, according to accepted chronology, about 1500 B.C. According to Diodorus, Sesostris, the Pharaoh of the Exodus, formed a project for the conquest of the world. It is said that he commenced the cutting of a canal uniting the Mediterranean and Red Sea, thus antedating De Lesseps by a trifle of over three millenniums, but apparently he did not finish it, leaving it to his successors, who did. But whether by transport overland or by building on the coast, he managed to fit out a fleet of four hundred vessels in the Red Sea, and started them, under the charge of Phœnician officers for the navigation, on their career of conquest, a gigantic piratical expedition, of course. There is little doubt indeed attaching to the despatch of this vast armament, although the chronology is more than doubtful, and we have only the mistiest record of the countries they visited and ravaged. In fact, our knowledge of that "first fleet" begins and ends with its despatch nine hundred years later (it was a leisurely age, and, as I said, its chronology is more than doubtful). Another sovereign of Egypt, Pharaoh Necho, fitted out a similar expedition, handled as before by Phœnicians, who achieved the feat of sailing round the Cape of Good

Hope about two thousand years before Vasco da Gama discovered it. However long these primary navigators took on this prodigious voyage, or what adventures they met with, we have no means of knowing; but how much richer the literature of the world would be if, instead of the incessant tale of slaughter, which is all we have, we could peruse the log-books of those ancient pioneers! and what would we not give to know whether they met with vessels of any other, to them, unknown nation! Alas, if they did, they probably made short work of them—that is, if they were able. It was an age remarkable for the promptitude with which all strangers, and therefore potential enemies, were disposed of. There were probably few commodities then less accounted of than human life.

But, although this first circumnavigation of Africa is intensely interesting, could we but get details of it from the time those intrepid mariners left their port of departure in the Red Sea, until they returned to Egypt *viâ* the Pillars of Hercules, it was, as far as we know, fairly peaceful, except, of course, for land forays. It is hardly likely that there would be any naval engagements on that long voyage, at any rate until nearing home, for there would be nobody to fight with except one another. In considering that voyage, moreover, we are striding far too much ahead, and must needs retrace our steps a few hundred years to the founding of the Carthaginian empire at Utica, the date of which is unknown, but which appears to have been about a thousand years before Christ. Probably every intelligent schoolboy knows that this, the first naval power of which we have any knowledge, was a colony from Tyre, founded by seamen in about

the most commanding position in the whole Middle Sea, for the prosecution of the peculiar industry which the Phœnicians had made their own, viz. oversea traffic. But they speedily supplemented this peaceful business by one entirely warlike, for they established a fleet of purely war-vessels, in which they sailed from shore to shore slaying or making slaves of such as opposed them, and planting colonies of their own for the purpose of exploiting such countries, but never penetrating far inland for some centuries. Their own hinterland they seem to have neglected altogether.

Still, even in their wars they were essentially mercantile, and consequently we find them lending a navy to Xerxes for the subjugation of Greece, which has been computed at two thousand war-vessels and three thousand transports, so mighty had their power become. By reason of this they had dominated the whole Mediterranean; but in this, the first naval battle of which we have any authentic record, they were so signally defeated by the Greeks, who, with hardly any vessels, managed to get on board the ships which were besieging Himera, and were probably crowded on the beach, that they lost, so it is said, a hundred and fifty thousand men and most of their vessels. It is probably a misnomer to call it a naval engagement at all; it was, more properly speaking, a land battle in which the combatants accidentally fought on board stranded ships. However, owing to the wealth and skill she had at her command, Carthage soon built another vast fleet, and pursued her career of rapine and destruction as before, thus succeeding in regaining her pride of place as mistress and despot of the seas. But in the course of the centuries, for men

were slow to learn in those days, the Greeks had gradually grown to emulate the Phœnician seamen in the art of naval warfare, being indeed driven thereto by the stern necessity of defending their very existence against the menace of the Persians. And, although they professed themselves entirely unacquainted with the art of fighting at sea, we all know how splendidly they acquitted themselves in their encounter with the Persian braggart, whose fleet outnumbered theirs as much as his enormous masses of men did the small, compact army of the Greeks. The naval battle of Salamis which was then fought was, although second in point of time, first in importance in the history of the ancient world, and established the Greeks as the equals, if not the superiors, of the Carthaginians in the new art of naval warfare.

I have said that in those leisurely days men were slow to learn, but of course there were notable exceptions, perhaps the chief of these being the manner in which the Romans, finding that their only hope of successfully coping with the Carthaginians was to fight them at sea, determined to build a navy, and, with that tremendous energy for the application of which they were notable, actually built and equipped in two months a fleet of one hundred and twenty galleys, having also, in the mean time, taught themselves how to handle them. And with this rapidly and rudely constructed fleet they put to sea, met the Carthaginians with a superior force, and utterly routed them.

It is now necessary to pause for a while in order to point out that these warships were all galleys, or vessels propelled entirely by oars, and that seamanship, as we understand it, had no part in their handling.

The men who formed the motive power could not fight, had they wished, being chained to the oars, nor could they either defend themselves or escape. In fact, as I have before pointed out, these vessels were merely the means whereby huge masses of men were brought into close contact with each other in order that they might fight hand to hand as they did on shore. Of course, it would not be long before it was discovered that a whole shipload of men might be disposed of at once by the summary process of ramming, and that to effect this a certain amount of manipulative skill must be acquired in order to thrust the beak of one ship into the bowels of another. But, with that sole exception, any approach to seamanship was absent, and remained so until it was found that sails might usefully be employed in naval warfare, and the first crude attempts at artillery, in the shape of ballistæ, hand-slings, arrows, and fire-pots, came into use. Unhappily, the desecration of the sea by warfare, having been thus bloodily commenced on a large scale, soon became general, and for many centuries the Mediterranean waters were the scene of constant battles, every nation on its borders taking a hand in the infernal game.

Throughout the next fifteen hundred years the history of naval warfare remains practically the same. Vessels grew little, as far as mere size is concerned, although the shape altered greatly, and gradually the equipment of sails grew in complexity and completeness. But still the galley held her own as the most deadly and efficient seafaring engine of war in those narrow seas—held it, too, long after the invention of gunpowder had made it possible for men to slay each

other without coming to handgrips. The wonderful Italian republics of Venice, Piza, and Genoa rose to amazing heights of power and wealth by reason of their maritime exploits, and Spain and Portugal launched out into the deep and wide Atlantic in quest of plunder—it is hardly fair to call it commercial enterprise. But, hardly noticed by them, an even fiercer, hardier race of seafarers had arisen in the North, beginning in the same way with vessels propelled by oars, but with one essential difference—every man was free and a warrior. The early history of our own country is inextricably interwoven with the exploits of these Northern pirates, who sought on the sea the wealth their own inhospitable shores denied them, and ravaged in turn every country within their reach that was fairer and wealthier than their own. To them, and to their lineal descendants the Normans, we owe our existence as a nation, and undoubtedly it is to their seafaring instincts we owe the present fact of our greatness in maritime affairs. Throughout these stormy centuries the story of the sea is one of continual bloodshed and rapine. The sea was the road to fame, and wealth was only obtained by robbery and murder. Peaceful maritime trading did not exist, because it could not. "Seafarer" was a synonym for pirate, a being whom the advance of civilization and Christianity was one day to wipe off the sea as a foul blot upon humanity. There is no room for discrimination, all were alike guilty where it was possible to be so. Even down to Elizabethan times, it is well for us to remember that, although great strides had been made in the direction of peaceful sea-traffic, many of the nation's heroes were

not a whit better than pirates, although their deeds bore a colour of legality, from the fact that they were ostensibly fighting the battles of their country by plundering and slaying, whenever and wherever they found them, all those whom they chose to regard as her enemies. It is a feeble excuse, because precisely the same argument may be justly used on behalf of the bloodthirsty seafarers of the Mediterranean during all the dark days I have passed over so rapidly, except in the few isolated cases where small bands of *bonâ-fide* pirates, without a country, fought and stole for their own pleasure.

It is, however, time to turn for a little while to the other side of the world, and see how in those far Eastern lands navigation began, as far as we know, with sea warfare—with probably one notable exception, China. It is only fair to suppose, knowing what we do of the essentially peaceful character of the Chinese, and the low repute in which the fighting caste has always been held among them, that their undoubtedly ancient seafaring enterprises were established and maintained as purely trading purposes. True, there were pirates among them, and of a peculiarly diabolical type, pirates who persisted in their evil calling until suppressed by our strong hand not so many years ago. Nay, there are pirates among them still, in a small way, and there is no doubt that if it were not for the careful policing of those seas, mostly by our ships, piracy would soon flourish again. But that was only a phase of the Chinese character. Piracy would specially appeal to them as being an easy method of amassing wealth by pursuing the peaceful trading-junks, running alongside and slaughtering all

the unresisting crew, then transferring the cargo to their own keeping. Note well the Chinese pirate never took any risks, never attempted to rob a ship when there was a possibility of resistance. True, there were so-called Chinese pirates who accomplished bold but horrible deeds, but it will invariably be found that they were commanded by a European, usually a Portuguese; and their crews were a mixed medley of Eastern races, the fierce, ruthless, and essentially warlike Malays predominating.

What I wish to point out, however, with regard to the immemorial navigation of the Chinese is that we have no record at all of their undertaking an expedition whose main object was warfare. The very idea would be foreign to them; for while the Chinese are first of all traders, then scholars, the man of war is to them a blackguard, a hooligan, one whose existence is a menace to the public peace—a condition of things worth any sacrifice to maintain. As an instance of this, and also of the average amenability to law and order universally obtaining among the Chinese, the celebrated marine edict of the Emperor K'ang Hsi, reigning from 1662 until 1723, may fairly be quoted. Great and splendid as were his achievements on land, his authority stopped with the shore. The peaceful coast-dwellers were made painfully aware of this by reason of the enterprise of Koxinga, a notorious pirate, who had established a regular co-operation among the pirates, and might, had he lived later, have termed the enterprise, "The Perfectly Practicable and Secure Piracy Company, Unlimited; Koxinga, managing director." This business-like pirate, having garnered the Chinese mercantile marine, turned his attention

to the coast-dwellers, so successfully that the hapless ones petitioned the emperor for protection. This he was unable to give them, as Koxinga was supreme at sea, and to overthrow him meant fighting; so, in a diplomatic mood, the emperor issued an edict that all the dwellers on the coast were to retire nine miles inland, where they would be quite safe from piratical raids. The edict was obeyed, and, in the result, was triumphantly successful. There is no record of how many fishermen starved to death, or what sort of experience the inland folks endured, but we learn that Koxinga, baffled by the ingenious method of frustrating his efforts, turned his attention to Formosa, then recently colonized by the Dutch. Having driven the hated Fanqui out—those who were not murdered—the enterprising pirate was ennobled as the "Sea-Quelling Duke," and became one of the chief officers of the emperor. As Dr. A. R. Smith, from whose delightful book, "Chinese Characteristics," I take the present episode, remarks, "The foreigner reading this singular account is compelled to wonder why a Government which was strong enough to compel such a number of maritime subjects to leave their towns and villages, and to retire at such great loss into the interior, was not strong enough to equip a fleet and put an end to the attacks upon their homes."

That, however, would not have been the Chinese way, and they alone among the nations who practised navigation may therefore be acquitted of having ever made a profession of naval warfare. But when we get away from the coasts of the Celestial Empire, and explore the islands of the Indian Archipelago or the groups of scattered islets in the Pacific, we find a

totally different state of affairs prevailing. These essentially maritime people constructed vessels of most ingenious build and profuse ornamentation, with the aid of the rudest tools and by dint of the most strenuous toil, for the sole purpose of warfare. The idea of commerce never so much as entered their heads. Their homes furnished them in utmost abundance with all that their simple needs cared for, as far as food was concerned. What they craved for was the stimulant of bloodshed, and, since to slay one another was monotonous and, besides, pointed towards extinction, which they naturally dreaded, they looked longingly towards the islands near at hand for the means of gratifying their desires. How long it took them to develop their war-vessels from the simple little tree-trunk, hollowed by fire and scraped into shape by sharpened shells, we have no means of knowing; but we do know that these naked savages, ignorant of all arts and totally without maritime models, did succeed in building huge war canoes capable of carrying hundreds of warriors over many miles of intervening sea. Their errand was solely war. It has been assumed by some that they sought food, being cannibals; but this I doubt, feeling assured from all the evidence obtainable that the eating of captives was entirely in the nature of a religious rite. No people could want food who were situated as these were—in the midst of seas teeming with fish, and on islands whose fertile soil produced, without any tilling, such enormous quantities of fruit.

One curious fact may be here noticed, viz. that while the art of ship-building reached to such a high standard in some of these islands, in others quite near

the inhabitants were unable to construct anything in the nature of a boat beyond the simplest form, the elementary hollow log. Another strange fact I must notice is, that even where the constructional skill of the natives in a maritime direction reached quite a high pitch, it suddenly stopped, for some unknown reason, and commenced to retrograde. I have myself seen in the roadstead of an island off Fiji, a flotilla of native craft not one of which was like another; while the range was from the coracle to the canoe capable of holding a dozen men plying their paddles and making the elegant craft fly along over the crests of the sparkling waves. But it was abundantly evident that there was no prospect of improvement, no ideas on the part of the natives of utilizing the new tools brought within their reach for the production of better or more seaworthy craft. There is, however, abundant evidence to prove that in no part of the world was the sea made more use of as a battle-ground than in the Pacific Ocean; and the same remark holds good, to a great extent, in that connecting link between the Indian and Pacific Oceans, the East Indian Archipelago — as, indeed, might be expected from the character of the inhabitants and the nature of their habitat. There is no doubt whatever that the Malays at some far distant period evinced sufficient nautical skill and enterprise to equip a maritime expedition which sailed as far as Madagascar, and invaded it so successfully that they became the rulers of the country, dominant lords over the aboriginal inhabitants with few exceptions, and those only in the dense fastnesses of the interior forests. This supremacy the Hovas, as the warlike Malay invaders were called, retained

until they in their turn were displaced by the French, with just as much right or excuse as they themselves had when they invaded the great island centuries before.

In the far north of the Indian Ocean we find that, from those far-away times when Sesostris sailed down the Red Sea and invaded India, there has always been carried on a desultory warfare. We know that both the Persians and the Greeks sailed those torrid seas, doubtless by the aid of the Arab seamen, who saw dynasty after dynasty rise and fall while they held on their own simple direct way of old-fashioned piracy. Sometimes, as under the caliphs, who spread their rule at the sword's point over so large a portion of the known world, these Arab seafarers congregated in such numbers as to be dignified by the name of a navy or navies; but concerted operations never found great favour with them. They much preferred acting independently, each vessel acknowledging no rule beyond that of her *nakhoda*, or captain, and having but one object in view, the conversion or destruction of the infidel, and, incidentally, their own enrichment by the appropriation of the infidel's goods and the bodies of the infidels themselves to be sold as slaves. But, whether acting singly or in concert, they never failed to find the highest religious sanction and encouragement for their bloodiest deeds; and when overpowered and destroyed themselves, they went blithely to their death beneath the bloodstained sea in absolute certainty of an eternal reward for their heroic efforts to spread the worship of Allah and his prophet. Nor can we cast too many stones at them, since much of our own sea warfare in early days was conducted on the same comfortable principle.

Aboriginal sea-warfare in the Atlantic was practically confined to the Caribbean Sea and the Gulf of Mexico, and never attained such proportions as the savage naval warfare of the Pacific, for the shipbuilding skill of the American natives of those islands and the shores of the Central American mainland halted at the construction of the dug-out capable of conveying at most a dozen men, and that only for very short distances. In short, they were not a maritime race at all, and when the winged monsters of the East burst upon them they, affrighted, ceased their puny efforts altogether, and never resumed them.

And now we must return to a consideration of that marvellous era when the bold and adventurous mariners of Spain and Portugal launched out into what to them were previously unknown seas and laid the foundation of that world-wide traffic upon all the seas of all the world of which we to-day are the chief representatives. Fired by tradition concerning the incalculable wealth of the East, accessible as they felt by sailing westward over the unknown ocean, stimulated as well as supported by the full sanction of religion, these bold men launched forth into the deep, their enterprise being as daring as any recorded in the history of the world. It is difficult, nay, almost impossible, for us to realize what these adventurers had to face. The cold recapitulation of their hardships must be supplemented by much imagination in order to gain the faintest idea of what manner of men they must have been. To take, for instance, those domestic and commonplace details of which we get nothing in history, such as the feeding and housing of seamen, and what an enormous sum of

human misery and human fortitude is opened up to us! Even when compared with the daily life of the peasant or common soldiers of those days, beside which we know that the existence of the prisoners in our gaols is positive luxury, how unbearable appears the life of the mediæval sailor! Cooped up in craft so small that an Atlantic voyage in one of them to-day would appear an act of suicidal folly, there were so many of them that there was hardly room to move, and every law of health was perforce violated. The stench, the vermin, the abominations of every sort, were impossible to enumerate, impossible for us in these happy days to understand. The food, and especially the water, was putrid beyond corruption, and only by appreciating the miracle of the human body can we begin to understand how it was that the vessels did not become simply floating charnel-houses. For one thing, only those almost superhumanly strong did survive, the weaker were quickly weeded out and dumped overboard.

Then came the dread of the unknown, the consequently recurring question whether they would not presently come to the edge of the world and be launched over it into bottomless space. Fortunately the rank and file of those days had few ideas. They could endure, they could fight, and they could die. And it is certain that, life being so full of horrors, none of them could have felt very much repugnance at the prospect of leaving it, for they could hardly expect anything worse than they were then enduring. Also there was always dangled before them, will-o'-the-wisp like, the prospect of untold riches in which they might possibly share. What they would do with

that wealth, if obtained, they never seemed to consider. Perhaps the love of adventure, which is innate in man, and was ever one of the strongest incentives to action of mankind, lured them on. But whatever it was that upheld them in their dogged facing of all those miseries, the simple fact remains that they did face them, and probably looked upon the prospect of fighting, of shedding blood, as an agreeable interlude to the terrible monotony of misery of which those early voyages were composed. Moreover, every member of the crew of one of those early ships of Spain and Portugal might well have said, in the language of Paul, "I die daily," in that, apart from the sufferings inseparable from a seafaring life, he was at the mercy of the cruellest of mankind in the persons of his own officers, whose only idea of discipline was the exercise of incessant brutality in such shape that the very reading of those practices curdles the blood and makes us wonder whether indeed these men were of like feelings with us. Really the idea will seize us, whether we invite it or not, that the actual warfare in which these men were engaged was far less terrible than the everyday occurrence of their miserable existences.

Yet, in spite of all, they did endure, did reach the golden land of promise, and there found helpless creatures of other races upon whom they could and did practise in their turn the atrocious cruelties which they themselves had endured, proving that they were lineal descendants of those ruthless pioneers of sea-warfare the Carthaginians, and that the advent of the Prince of Peace and their acceptance of His teachings as the way of salvation had not modified in the least, as far as their actions were concerned, the

awful passion for cruelty wherein man has excelled the most terrible carnivorous animals. Crowning horror of all, these deeds were done in the name of Christ, and ostensibly for the extension of His kingdom and love. The very thought makes one physically sick with disgust and shame, for that these were men calling themselves Christians, and their ships by the names of saints and angels, even more sacred names still, such as El Salvador del Mundo, El Espiritu Santo, Madre de Dios, or Santissima Trinidada.

Meanwhile in the blood-stained Mediterranean there was approaching a conflict which would vie with the most gory battles of ancient times, and the issue of which was to be fraught with much farther-reaching consequences to mankind. The sea-fights of Salamis, Platæa, and Actium, to mention only three out of the many that were continually taking place in those days, were between heathen, who made no pretensions to humanity, whose gods were bloody monsters, and whose pastime was destruction of human life and happiness. True, matters were not much bettered by the advent of Christianity, but the ideal of good was there, and promised in the fulness of time to bear fruit, for scattered about Europe and some part of Asia, like leaven in the lump, were holy men, ready to sacrifice life with a smile if only they might spread the good news of peace on earth, good will towards men. Then arose in the East the awful portent of the Mohammedan power, actuated by the fiercest fanaticism, which, with consummate skill, welded many races into one homogeneous body, impelled irresistibly forward to the conquest of the world. And these superb warriors, who welcomed death as a glorious

passage to joys unutterable, were no less skilful mariners than they were soldiers. They were also astute enough to welcome into their ranks some of the ablest of their Christian foes, who, becoming renegades, outdid their Muslim masters in deeds of cruelty and daring. While their armies on land pressed ever westwards towards the strongholds of Christendom with the irresistible momentum of the avalanche or glacier, they accumulated fleets of galleys, whereof the motive-power was Christian slaves, and the fighting complement the fiercest of their own ruthless tribes. Well informed of all that went on in Europe, they knew how weakened by luxury and dissensions were the Italian republics, notably that of Venice, which for so long had proudly withstood them, and had even carried maritime warfare into many of their chief ports. They were also fired with a determination to win back again the Iberian peninsula, from whence the brave Christian warriors had expelled their Moorish *confrères*, and thus at one fell swoop establish Mohammedan ascendency in the very stronghold of Christianity.

And so it came to pass that an almost despairing cry arose throughout Christendom; ancient jealousies were put aside; and the allied fleets of the Christian Mediterranean met, on October, 1571, with the armada of the infidel in the Gulf of Lepanto.

THE OCEAN AS A BATTLE-FIELD
(*Continued*)

THE battle of Lepanto preceded the defeat of the Spanish Armada by only seventeen years, and in the minds of many there is great doubt which of the two great events was the greater, as far as the history of the world was concerned. As far as we as a nation are concerned, there can be no doubt at all, although the conflict was between two nominally Christian Powers, of the greater importance of the latter event; but taking the broader, more universal view of the matter, I think it will be admitted that the issue of the battle of Lepanto had a profounder influence upon the history of the world than any other single conflict in that history; for it decided that the advancing civilization of Europe and the farther West still should not be crushed back into barbarism, should not again sink into the horrible slough from which it had so painfully emerged after ages of struggle. I hope I may be pardoned if I magnify mine office, but I cannot help saying that, in comparing these vast conflicts at sea with those that have taken place on land, the effect of the sea-victories always seems to me to have been incomparably greater; for, with the world subdivided as it is by the ocean, land conflicts are in a measure localized, but whoso has command of the sea, and occupies an

insular position, possesses also a supreme safeguard against the most powerful and malignant enemy without those advantages.

But this is by the way. I have chosen the battle of Lepanto to begin this chapter with, because it marks the passing of the old hybrid methods of maritime warfare. In all essential details Lepanto was the same as Salamis or Actium. It was fought by soldiers on board of the galleys propelled by slaves, and although artillery was used, the main object on either side was to get to hand-grips, as in the ancient times; to lock the ships together, and to fight as if on land. Sails were used, but very sparingly, since there was a far more reliable method of propulsion below, and the hamper of gear aloft was likely to fall and obstruct the fighting platform. It was, as all such conflicts have been, an exceedingly bloody battle, the Muslim losing 25,000 killed and 5000 prisoners, and the Christians approximately 8000. It is significant that no mention is made of the wounded, they were not accounted of in those days, for to be wounded was usually to die, unless, indeed, the wound was so superficial as to be tended by the recipient. And it is worthy of notice, too, that in sea conflicts, as on land, the advance in the perfection of weapons of war has resulted in an amazing diminution of the loss of life. In the most tremendous naval conflict of modern times, where the monetary value and offensive power of one ship probably equalled that of the whole fleet on either side at Lepanto—I allude to the battle of Tsu Tshima—the loss of life was not more than one-sixth of what it was at the former battle.

Now, tempting as the subject is, I feel that, in view

of the far more interesting matter to us which lies before me, I must quit Lepanto, with the reflection that there the maritime power of the Moslemah was finally broken, and that, although it was long ere the infernal nests of Mohammedan pirates, which abounded along the shores of Africa and in the far Eastern Mediterranean, were finally broken up, the snake was so badly scotched that it never again became a serious menace to civilization. We must now return to the Atlantic, where a new era had opened up with the discovery of the new world. Naturally the discoverers claimed it for their own, without knowing of its vast extent, and fancied vainly that they should be able to hold it, this amazing reservoir of wealth, for the aggrandisement of the mother-country and the Holy Roman Church. In this they reckoned without their hosts, and with all the arrogance which characterized the haughty hidalgos of Spain. Our own islands had bred a fearless race of seafarers, lineal descendants of the ancient Vikings, and, feeling the need of having a share in the world's wealth so long monopolized by the Latin races, began to poach upon the Spanish preserves. Here again the excuse of religion was readily made for the wildest excesses, the most flagrant acts of robbery and bloodshed.

But it is difficult for us to put ourselves in the place of the Spaniard when considering this question, remembering, as we must, his horrible cruelties towards the Dutch in the name of religion. Not even the most bigoted Roman Catholic would dare to accuse Protestants of attempting to spread their form of worship by fire and sword, although he would, doubtless, add a saving clause to the effect that, had they

believed in their religion as firmly as did the Catholics, they would have spared no effort, neglected no means to promulgate it among the nations.

Primarily, however, the reason for the English cutting into the Spaniard's rich preserves in the new world was the overwhelming desire to share in those fabulous gains, and the fact, in their belief, that in so doing they were also combating the vast tyranny of the Romish Church from which they had so lately been set free, was an added incentive of the most important kind. Moreover, the ships of the English were manned by freemen, each of whom, however humble, was guaranteed his definite share of the spoil, and, although for the good of all, the sternest discipline was maintained, there was also justice of the most definite kind for high and low. Again, these adventurers were independent, the monarch had no sort of control over them save that which they freely accorded. They fitted out their ships at their own charges, and invited co-operation by seamen on a profit-sharing basis, so that, although hardships were necessarily faced, they were also voluntarily endured for the sake of the reward that was to follow.

Now, the history of the long struggle between Briton and Spaniard upon the ocean, which culminated with the Armada, was one of practically uninterrupted victory for the English. As, indeed, it was bound to be, remembering the essential difference in the character of the men who did the fighting. There were no great fleets equipped to fight pitched naval battles, only a series of isolated conflicts between ships, all essentially one-sided affairs. The Spaniards had always the advantage in size of ships—a doubtful one at best in

those days—but, on the other hand, they were manned by slaves not only in name, but in fact. They were hampered by the bad old mediæval tradition, which made of the seaman but a piece of machinery only useful to get the ship from one point to another. When fighting was to be done, the soldier came forward—an alien on board ship, whose trade was fighting—and the sailor was whipped into the background. To oppose such a crew as this must have been a delight to the sturdy sea-fighters of England, every man of whom felt that upon him rested a certain proportion of the welfare of the whole venture, and was to invite the defeat which invariably came, no matter what the odds were—odds that in some cases were so disproportionate as to make it difficult to believe the records we have.

Now, while these desultory combats at sea made the grandest possible training for the English mariners, improving their seamanship and tactics of fighting, as well as giving them that sheer contempt for the enemy which counts for so much in all warfare when it does not lead to carelessness or neglect, the Spaniards apparently found it impossible to learn. They clung to their effete ideas, and only invited more complete disaster by increasing the size of their vessels and adding to their already unwieldy crews. And thus they led up to the crowning mercy of the Armada. Utterly unable to understand the reasons why their ships were taken, or why the English sailors seemed to be invulnerable to defeat, they collected that amazing congeries of vessels, with their polyglot crews, their equipment of monks and priests, and their store of manacles for the accommodation of the heretic prisoners

they were going to take, and then sent them forth under the command of a landsman to face the seasoned sea-fighters of England.

Indeed, it was well for us that the naval genius of Spain was of so poor a character, for, in spite of all we can say in praise of Elizabeth and her statesmen, the fact remains that, as far as the Government of the country was concerned, and the numberless warnings that had been given, disaster was actually courted by lack of preparation. Sheer patriotism on the part of our seamen, and an extraordinary combination of favourable circumstances, allied to the ineptitude of the Spaniards, prevented the invasion of England. Had the Spaniards been better seamen, or had they been ably led, another tale would surely have been told, the world's history would have taken a totally different form. Consummate seamanship was shown by the English seamen in their harassing of the unwieldy Spaniards and in keeping from close quarters with them, which meant being overwhelmed by sheer weight of numbers. But oh! the pitiful tale of want of ammunition, of food even, for the fighting warriors; it is, indeed, galling to remember. And it does not soothe us to remember the glorious ending of that great sea-fight, because we feel that we have skirted the precipice of disaster far too closely, and quite unnecessarily.

The defeat of the invincible Armada ushered in the new era of naval warfare, wherein the ship was used not merely as a means whereby masses of men were brought into contact with one another to fight in the same manner as they did on land, but as an engine of destruction herself, wherewith an opposing

ship or ships might be destroyed by the aid of artillery carried swiftly from point to point. Not, of course, that it entirely did away with hand-to-hand fighting on board ship, for boarding tactics still held favour for centuries, but it gave a small ship and a weak crew possessed of superior skill a great advantage which they did not possess before, that of holding aloof from a numerically superior enemy and defeating him by sheer skill in manœuvring and accuracy of aim. It was the real advent of seamanship in naval warfare on a grand scale, which had been led up to by the long series of solitary sea-fights between the ships of Spain and those of England.

As yet, however, there was, properly speaking, no navy of either England or Holland any more than before, and even after, the Armada, there was for a long time any navy of Spain. That is, neither country possessed a fleet of ships solely equipped for fighting and never engaging in trade, such as had been seen in the Mediterranean for centuries. Every ship was a trader ready to fight when the need arose, and it might just as easily arise from the sight of a richly laden ship of another nation, the plunder of which would add immensely to the profits of the voyage, as from the sight of a stranger eager to spoil. It was, indeed, a transition period for seafaring, a time for the abandonment of old ideas and the assimilation of new. It was just beginning to dawn upon the minds of Englishmen and Hollanders that as the fitting out of a fleet of vessels, with the twin objects of robbery and murder, as had so long been the case in the Mediterranean, was totally irreconcilable with the Christian ideal as understood by Reformers, so it was

unjust and unreasonable to deny the honest, peaceably minded merchant adventurer at sea the protection which he claimed and received ashore. The worthy men who ruled over the destinies of these two great maritime countries began to perceive, dimly and afar off perhaps, but still they did see, that commerce and war were incompatible, and that if the trade for which both countries were pre-eminently fitted, both by their geographical position and the genius of their people, was to flourish, there must be a total rearrangement of maritime affairs. The ship of war must be built and equipped for warlike purposes only, yet her principal mission must be the care of her country's trading craft, and not unprovoked aggression upon other nations. The merchant ship, on the other hand, must be freed from the necessity of carrying a large armament, and a crew far greater than was needed to work the ship, in order that the merchant might reap his legitimate profit, unhampered by these totally unnecessary expenses.

It was a revolutionary idea, for except, as I have hinted, in China, no such thing as an unarmed ship equipped for purely trading purposes had been hitherto known. And even the Chinese example was vitiated by the fact that every Chinese merchantman was a potential pirate, given sufficient opportunity, which indeed is the case to-day. But it took root and grew, very, very slowly it is true, still there was growth. Of course, the chief hindrance to its development arose from the merchants themselves, who were ultimately to be its chief beneficiaries. Full well they knew what great profits were suddenly to be made by the piratical onslaught upon a richly laden ship

of another country, with which their own might be, if not actually at war, at least on bad terms. Also they were fully aware how slowly the privateer and armed merchantmen of other nations would assimilate the new idea; indeed, it was difficult to imagine international law running upon the high seas, where the primitive

> ". . . good old rule, the simple plan;
> That he should take who has the power,
> And he should keep who can,"

still held, and seemed likely to hold, undisputed sway. Moreover, there was always the pirate, the real pirate, who was the Ishmael of the sea, and who owned no country; whose crews were composed of the reckless villains of all nationalities, ripe for any deed of savagery, if only opportunity offered. The horrible deeds of the pirates excite our indignation so much that we are apt to forget that they were the lineal descendants of the heroes of history, of the Vikings, for instance, who had absolutely no excuse for their deeds of rapine and plunder save the lust for wealth and cruelty, and whose only virtue was the one that all pirates have been credited with—that they willingly risked their lives and endured incredible hardships in the pursuit of their dreadful profession. Reading history, one can only come to the inevitable conclusion that the ancient kings and rulers, as far back as we can get, were simply pirates and brigands on a grand scale, but with less heroism than the pirates of the Middle Ages in that they risked their own lives but seldom, preferring to compel their unfortunate subjects to do their dread bidding while they lolled in luxury, receiving the plunder. Still, their piracies

had a colour of national enterprise about them, nefarious though they were, and they differed from the regularly named pirates in that the latter were invariably co-operative, profit-sharing enterprises.

But the better day was breaking in which there should be no room for the pirate, although it was slow in spreading its light. Meanwhile, war being still the normal condition of mankind, it was necessary, in order to spread the oversea trade of peaceably inclined peoples, that something should be done to protect the merchant vessels, and so we get the idea of the convoy. Trading vessels gathered their cargoes and congregated together until there were a sufficient number of them to form a fleet. Then under the protection of a few ships of war they sailed for home like a brood of ducklings under the protecting oversight of the *bonâ-fide* fighting ships. It was a cumbrous system, under which trade could grow but very slowly, the hindrances being so many, but it was a long step in the right direction, and it involved the final differentiation between men-of-war and merchant ships. It had, however, one tremendous drawback, which was that if the convoy was attacked by a superior force and defeated, the attacking fleet made a tremendous haul, their prizes being already collected for them. They had only to shepherd the helpless richly laden fleet to their own ports, instead of its original destination, in order to reap a harvest such as was impossible in the days of scattered single ships.

Now, in the new form of maritime enterprise, two Powers became pre-eminent, two Powers alike in origin, in enterprise, and dogged perseverance; and may it be said without suspicion of hypocrisy, with advanced

notions of honesty and fair dealing (for that period), such, at any rate, as the other nations were strangers to. These were Britain and Holland, and after the collapse of Spain with the Armada it seemed as if they would divide the oversea commerce of the world between them. This appeared the more probable because Britain's chief objective was the Americas. She fought for a footing there and wrested it from Spain; she was still prepared to attack Spanish ships wherever they might be found as knowing that they were an easy prey and that much wealth was to be gained from them as well as from the countries whence they drew that wealth. But the Dutch, with their plodding enterprise, had made the East Indian seas their El Dorado, and, except for an occasional brush with the original European exploiters of that far-off region, the Portuguese, were amassing wealth with about the minimum amount of bloodshed for those days. It is true that they did reach westward to North America, curiously mixed up with Englishmen, who, for faith's sake, were exiles from their country, but still, taking all things into consideration, the two growing maritime powers developed side by side with quite a small amount of friction. Of course, if gratitude were an ordinary human attribute, this should have been very strongly marked, seeing that Britain had practically crushed Holland's bitterest foe and not relentless persecutor, Spain. But, as quite recent years have reminded us, the virtue of gratitude need not be looked for either among nations or individuals.

Another great nation, however, was making a bold bid for the empire of the seas, not so much in a

commercial sense as for warlike purposes. France, having long been the cockpit of Europe, having been a battle-field for centuries, had at last emerged into the proud position of being the foremost among continental nations, and the fall of Spain gave an impetus to her warlike propensities of the greatest force. Her seamen were brave and adventurous, her naval architects the best in the world, and it was hardly to be wondered at that she should view the growing power of her hereditary enemy, England, with ever-accumulating envy and hatred. The great rebellion in England gave her a pretext, if indeed any were needed, to increase her naval forces and to look forward to the time fast drawing near when she might repay her ancient debt with interest. For it was obvious, even at that early day, that, so long as England was powerful at sea, it was hopeless to think of successful invasion. But now it really seemed as if the time was at hand when the long-cherished idea of humbling England at the feet of France might be realized.

Fortunately for us, there was no great weakening of our naval forces, although, even at sea, civil war was carried on, and the spectacle of opposing fleets, each under the British flag, was presented to the longing eyes of the continental peoples. But England was fortunate even then, because the Puritan spirit which formed the finest army that England has ever owned was alive in her fleet as well, and the naval genius of the race never shone brighter than at that troubled time. Robert Blake suddenly developed from a simple country squire into a leader of men, second only to Cromwell, and in an incredibly short space of time did

for the Navy what Cromwell had done for the Army. There is something almost miraculous in the rise of Blake to be one of the greatest, if not the greatest, naval captain the world had ever seen. In this the centenary year of Trafalgar, it is difficult indeed to think of any other British admiral than the immortal Nelson, and yet it seems ungrateful to forget Blake, whom even Nelson acknowledged to be his superior. This is not the place to go into much detail concerning the deeds of Blake, but he cannot lightly be passed over, because he represents to the full the new naval spirit of England. Up till his day the possession of a powerful fleet seemed to be an irresistible temptation to its owners to be aggressors, to use it for purposes of oppression; but such an idea was entirely foreign to Blake's essentially Christian spirit. "Defence, not defiance," was his motto, and the policing of the seas for the protection of British trade, and incidentally the trade of other nations, a part of his self-imposed duty. True he had first to drive off the sea the fleet of the Royalists, who, in his opinion, as well as in that of all who were best and noblest among Englishmen of that day, were inimical to freedom at home in the true sense of the word. In the prosecution of this arduous duty he learned his profession, learned to depend upon his seamen, although he might have been expected to have all the prejudices of the soldier. Following up the splendid traditions of the Elizabethan seamen, he grew to depend upon the sailor at sea instead of the soldier, and to care for his sailors with such fatherly solicitude that they gave him love and loyalty such as had never before been shown to a like degree from sailors to their officers.

Unfortunately, it fell to his lot to fight against the only other power whose aims were similar to England's, viz. the use of naval strength only for the protection of commerce at sea against unprincipled aggression. I allude, of course, to Holland. I have ever thought it a sad thing that such men as Blake and Van Tromp were brought into conflict, and I cannot at all determine, with any satisfaction to myself, which country was to blame in this almost fratricidal conflict. Nor would it, I fear, be of any service if we could definitely and impartially apportion the blame. It must suffice to say that, after a tremendous struggle, in which the heroic qualities of both sides were fully manifested, the gallant Dutch people were crushed, their country was brought to the brink of ruin, and Britain became absolutely mistress of the sea. What continental historians may say about the use made by her of this tremendous power does not matter; the events following cannot lie, and they tell us in plain and unmistakable language that she used her power for the benefit of mankind, and not at all for purposes of aggression.

Indeed, the events immediately succeeding the overthrow of the naval power of the Netherlands had all the characteristics of abstract justice. For the great Puritan admiral, having developed to the highest degree not only the fighting, but the diplomatic instinct in the course of his mighty struggle with the Dutch, was now to attack the ancient foes of his country and the scourge of Holland. There was no longer any question of an armada being fitted out to chastise the haughty Protestant islanders, but the fleets of those islanders actually maintained so close

a blockade of the Spanish coasts that the treasure ships from America, upon which Spain had grown to depend, were unable to reach her ports. They were snapped up one by one and their enormously valuable freights sent to England. But we are not so much concerned with matters of history except in the briefest fashion; what is far more germane to the present article is the gradual development of naval warfare. The ships were growing in bulk much faster than the enlargement of the guns could keep pace with them, and as the motive power was still the fluctuating and unstable wind, seamanship as opposed to mere fighting qualities was more and more becoming a fine art. Indeed, it is nothing short of miraculous to modern seamen how those old sailors ever did manage to handle such unwieldy craft, wherein every principle making for speed and handiness in a vessel was systematically violated. Doubtless many of these vessels could and did go at a fair speed through the water with a gale of wind astern, but whenever the wind drew abeam it must have been a terrible task to keep them from drifting dead to leeward like a barge laden with a haystack.

Yet the soldier-admiral Blake, by dint of encouraging his seamen and diligently learning from them, so handled these clumsy craft of his that he succeeded in performing a feat in which his great successor failed—the attack on Santa Cruz. Nor does it in the slightest degree detract from the glory of his exploit that the wind blew fair into the harbour for attack, driving his ungainly vessels into the narrow entrance between the formidable forts, and blowing his cannon smoke away from him into the eyes of his

foes, and then, when his great deed was done, it veered in the opposite direction, driving him out to sea again with an amazingly small casualty list for so great an exploit. He did not know that such a wondrous complaisance on the part of the elements would be shown towards him, but was ready to take all risks in the pursuance of what he deemed to be his duty. There was, moreover, another item of development in the great matter of naval warfare which Robert Blake made peculiarly his own. It is recorded of him that he first taught ships to contemn castles on shore, proving that, given a resolute captain, a ship was not only at a less disadvantage in the fight against a fort than had been supposed, but that she might even prove that a floating battery was superior to a fixed one. It was a momentous advance in naval warfare, of which the results were tremendously far-reaching, although, of course, its importance was hardly realized at the time.

But the next step taken by Blake was indeed a marvellous one, such as the world had never before seen. It was that of using the British fleet under his command for the purpose of policing the Mediterranean. The great inland sea, the scene of so much barbarity, was, although no longer terrorized by the Turkish armaments bent upon the conquest of Europe, still the chosen hunting-ground of hordes of Mussulman pirates, whose lairs were to be found all along the shores of Northern Africa, and whose strongholds had long bidden defiance to all forces brought against them. To cleanse these waters of this universal scourge, and to set free the wretched Christian prisoners, who, taken out of the ships of every

European nation, were languishing in the most terrible slavery, was a task that might well have been undertaken by an international fleet, could such a phenomenon have been witnessed under the conditions then existing. It would have been quite as worthy an object as that achieved by Don John of Austria at Lepanto, even if of less magnitude and European concern as regarded the fate of Christian nations. But Blake did not wait for such a union of forces, he was content to do what he conceived to be his duty, and abide the result. That result was a glorious one, for although he did not succeed in extirpating those piratical hordes and laying waste their strongholds, he inflicted so tremendous a punishment upon them that he entirely crippled their operations, weakened them so that they were never again able to do more than just petty acts of piracy.

All unconsciously, too, Blake then laid the foundation of Britain's naval power in the Mediterranean, a power which, through all the vicissitudes of later times, she was to retain. It was then, and it is now, an amazing spectacle, this island kingdom far in the Northern Sea dominating by sheer naval force the policies of all the countries bordering upon the Mediterranean, and defying all attempts to dislodge her from that proud position. Now, of course, owing to the opening of the Suez Canal, our predominance in the Mediterranean is of paramount importance to us in view of our enormous Eastern traffic, for no reasonable man can have any doubt that, if it were possible to oust us from Gibraltar and Malta and forbid us to maintain a Mediterranean fleet, a very short time would elapse before our trade to the East would be

strangled by all sorts of vexatious restrictions expressly designed to that end. It is to me an inspiring thought that, after all the centuries of blood-shedding upon the waters of the Mediterranean Sea, all the terrible deeds done solely for the purpose of robbery and murder—dignify these crimes by what other names we may—a power should at last obtain the pre-eminence whose palpable object was, and is, the preservation of peace in order that commerce might be free to develop upon lawful lines, and that the merchant seaman might go upon his peaceful way, none daring to make him afraid.

The good work accomplished by Blake in establishing a fleet for the protection of commerce instead of aggression suffered a temporary set-back with the Restoration. We need not linger over these disreputable days, for they cannot be considered without deepest shame, but pass on to the much more satisfactory fact that, in spite of all that a corrupt Government could do, the naval power of Britain was only temporarily weakened, it suffered no permanent degradation. No other nation was able to wrest from us our proud title of Keeper of the Peace of the seas, and through all the welter of European warfare there remained one force always to be reckoned with that could turn the scale whichever way its possessors listed, and that was the Navy of England. It is true that during our shameful and entirely unnecessary war with our own flesh and blood, the American colonists, we experienced many isolated defeats of individual ships, which was only what might have been expected under the circumstances. But they were merely incidents, and had no real influence

upon the sea-power of Great Britain, much as has been made of them, and is even now made, by American writers. There is really no need to press the point, the proof of it may be found in the fact that we were able, alone among European nations, to curb successfully the Napoleonic tyranny, to put bounds to that all-grasping ambition which aimed at nothing less than the enslavement of the whole civilized world.

What is more to the point is to note how slow was the march of nautical improvement. Ships were getting bigger and more unwieldy than ever, especially those designed and built by the French and Spaniards, but the artillery remained much the same as in Blake's time, and the principal object in naval warfare was still to close with your enemy, run him aboard, and settle the matter in hand by personal combat, as in the days of old. In fact, I am inclined to believe that artillery had less to do with the settlement of naval engagements than it had in the days of Drake. Yet, in spite of all the drawbacks consequent upon the types of ships which were used, and of the hindrance inseparable from the handling of the vast top-hamper required for the moving of those ungainly hulls, naval warfare was becoming more and more the peculiar province of British men, and the record of the seventeenth and eighteenth centuries in naval matters is a very cheering one for us. Dimly and afar off it is true, but still effectively, we had come to recognize that sea-power was the prime factor in international warfare, and we spared no expense, no pains, to maintain our predominance therein. How ably we were aided by those glorious men, that splendid band of leaders of whom Nelson was the bright particular star,

history tells us plainly; but it is, to say the least of it, curious that Napoleon, with all his transcendent military genius, did not recognize this. It only goes to show how the greatest of men have their limitations, their points of failure. The ability of Captain Mahan has shown us how all through the mighty struggle with Napoleon which we waged, not alone for our own freedom, but for the liberties of Europe, sea-power was the predominant factor, and that the smashing of the French fleet at the Nile and the crowning mercy of Trafalgar really settled the question whether Napoleon or freedom was to sway the destinies of Europe.

Now, men began to recognize that the ocean was not only the great battle-field, but that the nation which obtained pre-eminence in that exotic warfare was sure to be the arbiter of peace and war, was bound to be in an unassailable position as regarded its own interests, so long as it took care to keep that pre-eminence. It will, I suppose, be set down to mere insular hypocrisy, as usual, when I say that it was a good thing for the world that this pre-eminence should have been reached and kept by Britain. I care not, because I know it is true. Can we point to any other nation and honestly say that they might be trusted with an overwhelming strong navy and perfect knowledge how to use it? It is hardly worth while to put the question, because every man honestly minded, no matter what his nationality may be, will know, even if he does not care to give the answer. But I am going ahead too fast, since I want to point out how essentially naval conditions have altered since the days of the old wooden walls—days not so far

removed in point of fighting conditions from the historic times of Platæa, Salamis, and Actium.

Steam came, unexpectedly, unwelcome to the essentially conservative minds of those who ruled over naval matters. But the keen men whose business on the great waters had been rendered so easy and safe by the labours of the British Navy in the cause of peace, were quick to see the possibilities underlying this new motive-power, and they seized upon it with avidity. In spite of all that pseudo-scientists said in its disfavour, the merchants persevered, and soon steam navigation had arrived obviously to stay. It is a notorious fact that in Governmental affairs nations are always behind their commercial interests (except in the case of the Japanese), and so we need not wonder that it was late before the Admiralty sanctioned the fitting of the old wooden walls with paddle-wheels and engines, later with propellers, long after Ericsson had laboured and demonstrated to the thick-headed Lords in vain the advantages of his screw. But, once adopted, events moved rapidly. A Frenchman invented an armour-clad vessel, *La Gloire*, and Britain replied with the *Warrior*. Thus the great race was begun which is still in progress, but in which we still are easily first. Not only first, but far ahead, as indeed we must be.

Meanwhile, thanks to Britain's command of the sea, ocean traffic had assumed gigantic proportions. The lion's share of this commerce belonged as of right to us. I say "us" of right, for had we not led the way in freeing the universal highway from those bars to honest traffic which had so long prevented its extension? No longer dared piratical ships, under any

pretext whatever, prevent merchant seamen from plying upon the high seas for their honestly earned bread. Thanks to our efforts, the day of the pirate, whether national or private, was over. Of course, it will be said that in this keeping of the peace of the sea we were merely consulting our own interests. Be it so, a fair field for commerce, an open road for ships engaged in honest trade, and let the best, the most energetic, men win. If we were the most energetic we should win, but there should be an open free field anyhow. And there has been for the last hundred years, thanks to Great Britain alone.

Then came war again, a senseless, profitless war, but one in which the value of the new motive-power was put to a practical test; not that it was at all a fair test, since all the warships employed in the Black and Baltic Seas were of the old and ungainly type in use at Trafalgar, but with the addition of steam-power. Nevertheless, unhandy as they were, it was at once seen how immense was the advantage gained in being able to handle your ship without sails, not independently of the wind as yet, because an ordinarily strong breeze ahead would effectually stop one of those vessels despite the utmost power of her engines. But despite all the drawbacks, every man recognized the dawn of a new era in naval warfare, and saw dimly the immense possibilities thereof. Such warfare as took place under these early steam conditions was of so unimportant and one-sided a character that practical lessons were few; and although invention followed invention, improvement improvement, with almost startling rapidity, no opportunity occurred to test the new engines of war with that thoroughness which was necessary.

As usual, the merchant and his shipbuilders led the way in the adaptation of science to nautical affairs, and by reason of their generous payment of inventors, as well as their appreciation of the great services rendered them, they always secured the best talent available. These designers and inventors, however patriotic, could not afford to sell their high qualifications for the miserable pittance offered them by government, and so progress was always comparatively slow in the Royal naval dockyards. And when it was quickened on the advent of steel for shipbuilding it was always by outside pressure, always at the instance of men who had sufficient faith and patience to persist, in spite of numberless heart-breakings and disappointments at the hands of pompous hide-bound officials, whose idea of the public service was to hinder and not to help forward anything proposed for the national benefit. It must, however, be admitted that when at last the great forward movement in the equipment of the Navy did come, it came with a rush, and the hearts of patriotic Britons were made glad by beholding their Navy brought up to a position in which it was theoretically fit to face any combination of two first-class powers against us. Experience was lacking, though, in the working under actual war conditions of these amazingly modern vessels of war; for all the old ideas of naval warfare had entirely passed away, and all things had become new. The war between China and Japan settled nothing, as it was essentially a one-sided affair. The Spanish-American war did very little more, because it, too, was one-sided to almost the same extent as the conflict last mentioned. And it is very little to the credit of the people of the

United States that they raised such tremendous shouts of exultation over their defeat of ships that were helpless to resist attack.

Then came the battle of Tsu-Tshima, wherein it was hoped that some lessons might be given us, some settlement of urgent problems arrive. In some measure this was the case, in spite of the fact that here, again, one fleet was perfectly equipped, disciplined to perfection, and every man on board a patriot of the noblest type, while the other fleet, though numerically stronger, was heterogeneous in composition, honeycombed with mutiny, and effete by reason of departmental corruption. But these disqualifications, at least the extent of them, were not fully known until after the battle, wherein a great fleet was destroyed, while the victors suffered practically no loss at all. It has brought the story of the ocean as a battle-field right up to date, for, with the exception of the submarine, every modern engine of war used at sea was brought into play, while the opposing forces were of a magnitude truly colossal. The mind almost reels to think of the play of those terrible 12-inch guns, with their 850-pound projectiles, rending foot-thick steel-plates and bursting with volcanic force in the bowels of the devoted ships. Never since the world began has man been enabled to let loose such awful elements of destruction, to which, indeed, the ships and marine weapons of our ancestors were but playthings. And yet, in spite of the almost incalculable increase in death-dealing potentiality, and of the enormous damage done, measured in millions of value; in spite, too, of the non-floatability of the materials of which the ships

were constructed, we are confronted by the amazing fact that the actual death-roll was really trivial as compared with that of many of the conflicts at sea in the Middle Ages: the sea-fight of Lepanto, for instance, in which some 33,000 perished, or fully six times as many as died at Tsu-Tshima, although the boats of the modern iron-clads, when armed, were far more powerful than the galleys of the mediæval mariners.

Therefore, those of us who long for the days when war shall cease, and who shudder at the awful spectacle of man warring upon the sea, may be encouraged, and hope that, with each advance in the destroying capabilities of ships of war, the time may be brought nearer when the ocean shall no longer be used as a battle-field, but remain simply the grand open road, toll free, and uniting the nations which it divides.

WHAT THE OCEAN MEANS TO GREAT BRITAIN

If a compendious answer in the briefest terms possible were desired to the question in the title, we might truthfully reply in one word, "Everything." But, while this one-word answer really does state a great fact, it is absolutely necessary to go into details for many reasons. The great mass of our population assent in a careless, non-understanding way to the statements that "Britain is the greatest maritime nation in the world," "that if she loses the command of the sea Britain is doomed," that "seven-tenths of the food consumed in Great Britain comes oversea," and so on; but only a very small minority take any intelligent interest in this first of all questions affecting Britain. So, although there is plenty of sentimental interest in the sea and seafaring, there is a lamentably small amount of practical knowledge of these great matters, and it may be stated, without fear of contradiction, that there is a hundred times more interest taken in a spicy divorce case, a big football or cricket match, or a sordid murder trial, than is ever manifested in the most epoch-making development of our mercantile marine. We are, indeed, a curious people; utterly incapable, apparently, of having a fixed national policy, with a constitution unwritten, the most

unbusinesslike form of government the world has ever seen, trusting apparently, in all things, as a nation, that we shall muddle through. And yet we pride ourselves on our practicality, our freedom from excitement, our businesslike qualities, our ability to teach the rest of the world how to do it. We assist the best of our manhood to leave the country and spend millions upon the worthless and wastrel, treating them, indeed, far more gently and liberally than we do the honest hard-working folk whom we tax to keep them. We almost literally fulfil the command, as regards our foreign relations, "to love our enemies, and do good to them that despitefully use us," but when our philanthropy is called upon for our friends, we shake our heads and refrain. We behave as a man might who spent all his substance upon beggars, impostors, and swindlers, leaving his own family to pine for the necessaries of life.

And yet, in spite of all these paradoxical qualities, we have thriven, we do thrive, although there are not wanting signs that we have nearly reached our zenith of prosperity, if not quite, and that we shall soon begin to descend the height climbed so painfully for many generations. In nothing is this so manifest as in our national treatment of the greatest of all our interests, seafaring, which is, indeed, the very Cinderella of our professions. The successful merchant, great surgeon, wealthy brewer or distiller, or astute lawyer, are frequent recipients of those honours which flow from the throne, but the greatest shipmaster, whose skill and perseverance and courage has probably been greater than that of any of the foregoing, is always unknown, and retires into obscurity, often into poverty, especially

if, after many years of successful navigation, he should, after the manner of men, make one mistake.

But it may be said, "Why begin an article on what the sea means to us with a diatribe like this?" I cry you mercy; my only excuse is that, in season and out of season, I feel called upon to denounce the utterly unmerited neglect meted out to the men of the Merchant Service, and consequently zeal often outruns judgment. Enough! let us to the subject immediately in hand. In other portions of this book, I have glanced rapidly at the conditions which made this little group of islands in the North Atlantic heir of all the nautical mercantile traditions of the civilized world. But, in considering what the sea now means to us, it will be well to remember that, before ever we had entertained an idea of founding a great oversea trade, the Italians especially had built up powerful republics upon this foundation. With a whole continent at their backs full of incalculable riches, the great men of Pisa, Leghorn, Genoa, and Venice deliberately chose the sea as their road to wealth, and worthily they pursued it, doughtily they fought for its maintenance. It was not until they, by reason of quarrels with one another, warring factions at home, and restricted area for their operations, began to dwindle, and the English, lineal descendants of the ancient Vikings, and with distinct traces of an elder ancestry—that of the trading Phœnicians—began to push forward into remote parts of the world in strenuous competition with the Latins, and discovered that, in all things appertaining to seafaring, the English were the superiors of the Latin. It was a momentous discovery, and it fired the blood of Englishmen generally

to such an extent, that it may well be doubted if there has ever been such an enthusiasm for the sea and its power to connect Britain with the ends of the earth as there was in Elizabethan days. The hardships were terrible, but the English seamen had consolations withheld from the seamen of any other nation—with the sole exception, perhaps, of the Dutch—in that they were sharers in the profits of the ventures, being freemen, and treated as such. Truly, the discipline was hard, as was the life generally, but it was binding upon all alike, and if any tyranny was attempted, it soon met with its due from these sturdy sea-dogs, who knew so well how to work and fight to protect the results of their work. But, when all has been said that can be said in praise of the maritime enterprise of the seventeenth century, it remains true that it was only what the modern American would call a get-rich-quick scheme: it was not a necessity of national existence, for the country was quite self-supporting; it contained within its own borders all that was needed for the wants of its moderate population. But we were ever a turbulent, restless race, impatient of restraint, the true stuff of which empires are builded, and none in those days, at any rate, were oppressed by craven fears of becoming great.

This spirit of adventure, reckless of perils yet calculating profits, made our seamen enter into competition with the mariners of the older type and defeat them on their own ground with comparative ease—made us, earlier than any other people, establish the principle of a merchant marine, protected in its lawful business of getting wealth by honest toil and adventurous voyaging by ships especially equipped

for fighting, if need were, but primarily designed to protect honest trade. And this division of duties once firmly established, the world discovered that a new spirit was abroad—the spirit of British conquest by peaceful means of the world's trade. At this time the people were fully alive to all that oversea traffic meant to Britain, although it did not in those early days mean anything to what it means now. Still, it cannot be denied that when the Americans, our own kinsmen across the sea, commenced their wonderful seafaring career, we were resting upon the laurels we had gained, apparently satisfied with the position to which we had attained, and unwilling to believe that any improvement was possible. This complacent satisfaction with ourselves is a national failing that needs, as happily it has obtained, sharp corrections, which we have usually though not always profited by. I am here tempted to a somewhat serious digression, but one warranted, I think, by the subject. When the great Scandinavian inventor Ericsson had so far perfected his screw-propeller as to fit it to a small vessel and steam up and down the Thames, he obtained an interview with the Lords of the Admiralty in order to try and induce them to fit his invention to warships. They listened to him in contemptuous silence, saw what his little boat could do, and then, in grandiose fashion, called his attention to the mighty paddle-wheels of the warships fitting out, and asked him if he thought his contemptible little device would compare with those! So, broken-hearted by his conflict with official stupidity, he gave up the struggle and departed for the United States, where he was received with open arms, and eventually repaid his hosts by

saving the Federal Navy with his *Monitor* destroying the *Merrimac* in Hampton Roads.

We did not readily assimilate the lesson our kinsmen across the sea had to teach us. For it must be admitted that whatever we say, by whatever title we may designate ourselves, we are essentially conservative, although with our usual exposition of the paradox some of the most radical changes we have made have been the work of the party calling itself Conservative. It was not until we found ourselves being beaten upon every sea, found the ships of the vigorous young republic making their voyages while we were making passages, that we bestirred ourselves to remodel our ships and our methods—to learn, in fact, from our hitherto despised competitors how to save time in crossing the seas. It was a great lesson conveyed in a variety of ways. First of all, in the contour of the ships. Our old bluff-bowed, heavy-sterned ships with their clumsy top-hamper and their deliberate officers had to be remodelled. The builders of Blackwall and other typically British yards had to learn that speed was not incompatible with the strength and safety they felt indispensable in the building of their ships. But nothing would or could induce them to build in the same manner as the Yankees, who flung their ships together of soft wood and in the most casual manner, so that when at sea they were all a-work, almost like a basket, as old sailors used to say. British shipbuilders, however, learned to discard old-fashioned shapes of hull for the clipper models of the New England shipyards, and in a few years began to turn out ships that could and did hold their own with the smartest of the Yankee flyers. In those few years,

however, the Americans built up an enormous oversea trade by reason of their superior speed and the wonderful ability of their officers. In this latter respect, again, they showed us the way out of our old-fashioned ideas of navigation. The American officers did not believe in shortening sail every night at sunset in man-of-war fashion, with whom rapid passages were of no moment, nor did they believe in reducing sail at the first premonition of bad weather, or in waiting until a gale had blown itself right out before they made sail again. They took every advantage they could of the wind while it lasted, only reducing sail when it was impossible for the masts to bear the strain any longer, and on the first slackening of the gale making sail again.

Now, it must not be supposed that British seamen were not just as brave and skilful as these kinsmen of theirs in the United States. But they were, as sailors have always been, pre-eminently conservative, and slow to learn, so that when the energetic Yankees introduced their pushing ways into shiphandling, they immediately gained a very great advantage, which they kept until the disastrous civil war. Disastrous, that is, to American oversea trade, for the damage done to American shipping by the Confederate cruisers was irreparable, in that the British shipowners and seamen, having learned their lesson, stepped in and took the waiting trade, conducting it on such improved lines that it was impossible for the Americans ever to regain the ground they had lost. Moreover, they had now to compete with the most beautiful models in shipbuilding the world had ever seen. Hall, of Aberdeen, Steel, of Greenock, Scott, of the same

place, and others, vied with each other in turning out vessels of yacht-like appearance and enormous spread of canvas, many of them being of what is called "composite" build—that is, having a framework of iron and a skin of hard wood, thus combining elegance with strength. In vain did the Yankees strive to compete with these new clippers, and publish long fictional accounts of the superior prowess of their soft-wood ships, the hope of their supremacy at sea, which had at one time seemed so probable, having entirely gone.

An interesting parallel has been drawn between sea and land traffic by the remark that the mail and passenger coaches had never been so splendidly built and handled, or the organization of their services been so perfect as at the advent of railways; and in like manner never had there been seen such splendid clipper ships as were built between 1840 and 1870, or well within the memory of many seamen now living, at the close of which period it had become evident that steam had come to sea to be the power of the future ship. Great firms, like Greens, Money Wigram, George Thompson and Sons, Devitt and Moore, Ismay Imrie and Co., Brocklebanks, and a host of others hardly less famous, had accumulated splendid fleets of sailing ships, and appeared almost to monopolize the trade of the world. The British seaman was *facile princeps*, and the Americans, relinquishing the unequal contest, turned their attention to the development of their vast internal resources and their huge lake traffic, which has a character peculiarly its own.

Before going any further, however, in our cursory

examination of the development of British seafaring, we must note another factor in the development of British Merchantile Marine of the utmost importance. The repeal of the corn laws and the adoption of free trade by Great Britain gave a tremendous and unparalleled impetus to her oversea trade. Every country washed by the sea, more especially new countries like America, having produce to sell, found a new market flung freely open to them, and hastened to pour in supplies of all kinds, which were mostly carried by British ships. It was the golden age of shipowning, but one consequence of the new departure must never be lost sight of: it made Britain each day more and more dependent upon her oversea traffic for her national existence. However, such was the prosperity of the country under the new *régime*, and so cheap did food become, that no one thought of the inevitable consequences of becoming dependent entirely upon food borne over sea. Only certain of our people, those engaged in agriculture, began to feel the pinch and make outcry against the new order of things, predicting the ruin of agriculture. But as they had done that for many years without adequate cause, no notice was taken of them. Not that I think they would have gained much attention anyhow, being, in comparison with those who were flourishing under the new state of affairs, but a feeble folk.

But we must now hark back a little to note a tremendously accelerating factor in British shipping business—the advent of steam. It is curious to note, remembering the extremely arrogant claims made by the United States to lead the world in enterprise and ability, how completely they failed to grasp the

significance of steam as applied to shipping. There can be little doubt as to their having possessed not only the first steam vessel, but also the first call upon Ericsson's splendid invention of the screw-propeller, which conservative England would not then look at. Yet, in spite of their undoubted inventive genius and great energy, they did not grasp the occasion offered them of regaining the maritime supremacy they had lost by developing the new motive-power at sea. Instead, they went on building wooden sailing ships while Britain was turning out from her well-equipped building yards iron sailing ships in great numbers, which were faster, more seaworthy, and incomparably better cargo-carriers than wooden vessels could ever be. Side by side with this development of the iron sailing ship came the introduction of steam for ocean-going ships. And when it was too late the Yankees saw what a mighty future was in store for steam. They then tried to compete—with the Cunard Line in the beginning of things—but made a complete failure, leaving Britain in possession of an almost complete monopoly of the new ocean traffic. Our only other competitors worthy of notice at this time were the hardy and thrifty Scandinavians, for the German Mercantile Marine was practically non-existent owing to the war with France, wherein the superiority of French warships and seamanship had been the only bright spot amid the otherwise universal cloud of French disasters.

Our position, then, a third of a century ago, was one of apparently unassailable commercial supremacy. We controlled the commerce of the world, for we were almost the only carriers between nation and nation;

we possessed a monopoly of shipbuilding as of almost every other form of manufactures, and although our internal resources in the matter of food were dwindling very rapidly, no one thought of that in view of the great fact that all the new nations were eager to supply us, and by reason of our magnificent system of ocean-carriage, cheap food was poured into the country in an ever-increasing ratio. Not only in non-perishable goods, such as grain, but refrigerating processes had been discovered, and meat killed at the Antipodes was being put upon the British markets as fresh and sweet as if it had been slaughtered at home. Still, with all these object-lessons before us, it is certain that neither the working classes, the middle classes, nor the ruling classes adequately realized whither all this unexampled development of our oversea trade was tending. Here and there warning voices were raised as to the tremendous responsibility we were incurring in thus making ourselves dependent upon seaborne food, but for the most part these voices were unheeded. At last, and mainly owing to the persistent hammering away at the subject by one London newspaper, the *Pall Mall Gazette*, a genuine scare was raised in Parliament, and the public attention was focussed upon the Navy. It was pointed out, in the strongest and most unmistakable terms, that even supposing we possessed (which we certainly did not) an army capable of competing in point of numbers with that of any European power, that army would be helpless if unfed, and unfed it certainly would be if the constant supplies of food from oversea upon which we had grown to depend could be intercepted for only a few days. In short, we were shown to be living in a fool's

paradise, and the only hope that we had of maintaining our national position, under the peculiar circumstances into which we had grown, was by building and keeping up a Navy capable of dealing with any probable coalition of European powers against us.

And so we come to a consideration of the other phase of what the ocean means to Great Britain—her Navy. Very rightly the proper maintenance of the British Navy is held by the majority of Britons as essential to our existence as a nation, but there is certainly not the same amount of intelligent appreciation of the reasons why this should be so—which accounts for the widespread ignorance of the work, the functions of the Mercantile Marine, and the apathy generally manifested when any question affecting, however vitally, its welfare crops up. Yet it may be stated, without any fear of contradiction or of the accusation of belittling the importance of our only line of defence, that without the Mercantile Marine the Navy would be without a *raison d'être*. This fact was, I feel, not so very long ago ignored by naval men generally, who looked upon merchant seamen as belonging to a lower caste—as mere mechanics, in fact, who were fit to do servile work only, and were of very little account in any case. This attitude, if entirely reprehensible, is very human, and is certainly not confined to the Navy. It may be seen in lesser but no less offensive degrees among policemen and civil servants generally—for genuine contempt for his employers' commend me to a Somerset House clerk when approached on a matter of business to which he is well paid to give his attention. Happily, as I feel, this contemptuous attitude on the part of naval

officers towards the men of the Merchant Service has almost disappeared, largely owing, I believe, to the presence in the Navy of so many Merchant officers, who have entered the Navy through the medium of the Royal Naval Reserve.

Leaving all these considerations behind, we have in our Navy an arm of which we do well to be proud, and towards which every citizen should feel the very highest sentiments of gratitude and loyalty. But in this, as in many other matters, we might well take a few lessons from our bitterest enemy, Germany. A strong navy is not in the least necessary to Germany's national existence as it is to ours. If her great over-sea trade were totally destroyed to-morrow she would be impoverished very greatly, and there would be much distress, no doubt, but not one of her subjects need to starve, nor could she be deposed from her admittedly high place among the nations. Yet over the whole of the German Empire there flows an ever-swelling tide of the most intelligent enthusiasm for both her Navy and her Mercantile Marine such as we, in this country, are absolute strangers to. And this enthusiasm is not wasted or allowed to dissipate in talk. It is guided into practical channels by Government, fostered by the emperor, and is bearing fruit in very notable ways. The German Navy League is an immense power for the upbuilding of the German Navy, and so widespread and popular is it that its latest development is that the women of Germany are providing a first-class battleship which they will present to their country—a gift of over a million pounds sterling. We have a Navy League, too, which endures a precarious existence, is looked upon as a

nuisance by both parties in the State, and is anathema at the Admiralty. Every piece of work it has done, every single item of admittedly much-needed reform of which it has been the means, has been accomplished in the face of direct and almost virulent opposition by the Government of the day. Any recognition of its services to the nation by any member of the Royal Family, to say nothing of the king himself, is unthinkable, and yet, in Germany, with a need infinitely less than ours for such an institution, how eagerly does the kaiser tender to the Navy League his powerful patronage. I hold no brief for our Navy League, not being even an honorary member, and thus reserving my right to criticize its operations; but I do believe that the treatment it meets with in this country is a fair sample of the attitude of our people towards anything which concerns their best interests.

Fortunately, we have had of late years a sympathetic appreciation of the Navy's needs in the highest Governmental quarters, and a reorganization of the headquarters of naval affairs, the Admiralty, which is full of hope for the future; for although, as a people, we are careless and culpably ignorant of what the Navy really is and what it means to us as a people, we pay whatever is asked for its extension and upkeep without a murmur, and resent nothing so much as any suggestion of its being weakened for any consideration, political or otherwise. Indeed, there are not wanting signs that, owing to the indefatigable labours of certain journalists in influential organs of public opinion, aided immensely by the efforts of the Navy League, the general public is being awakened to some intelligent interest in the Navy and its duties. So

much so, that it is possible now to hear, whenever men are gathered together for conversation, some more or less intelligent remarks made upon the status and functions of the Navy, and sundry comparisons made between the work of the Admiralty and the War Office, the sailor and the soldier—much to the disadvantage of the latter, in each case. Which is all to the good, because, with the stress of national competition now existing, it is more than ever essential that Britons shall know what the command of the sea means to Great Britain, and that public opinion upon this all-important matter shall be intelligently guided, its great force concentrated in a right direction, and not dissipated or swayed about in useless directions through lack of knowledge.

Before leaving for a while this most important phase of what the ocean means to Great Britain, it will be well to take a cursory glance over the march of naval affairs during the last quarter of a century. At the beginning of that period the principle of the ironclad had been firmly established, and the development of the turret had also begun. But Britain lagged behind, as usual, in taking up new inventions for the Navy, and, consequently, the strange spectacle was seen of our having up-to-date ships armed with obsolete muzzle-loaded guns and antiquated machinery for working them, while our then great rival at sea, France, was pushing on, feverishly adopting almost every new invention, although quite unable to keep pace with our rate of building ships. But stranger still was the fact that our private shipyards were turning out fully equipped men-of-war for foreign countries, which in speed, in armament, in stability,

were far superior to anything which our Government possessed. And when we did make a start in the direction of improvement, we entered upon a period of failure that was positively ghastly, the ships being veritable death-traps, incapable of keeping the sea in bad weather or even of being steered. But happily a better day dawned before it was too late; the best possible talent was secured for Government yards, and a very large amount of work was given to private yards of proved capacity, which showed Europe that, not only had we the money and the will to spend it, when necessary, but that our rate of shipbuilding was such that no other nation could hope to approach us or put ships into the water so rapidly that they had not time to become obsolete before they had done good service.

With some, however, it is a question whether we have not gone ahead too rapidly, whether the vast congeries of complicated machinery which goes to make up a battleship or a first-class cruiser to-day is not getting beyond the power of the human brain to handle in a time of stress of actual war. We have ships of amazing speed, whose vitals are protected by almost unpierceable armour, guns of terrible power and range, which, under the direction of skilful men, can be aimed with marvellous exactitude so as to strike a target much smaller than a ship at a distance of several miles; but the question of what would happen if two fleets of fairly equal strength, with equally brave and intelligent crews, and all equipment and ammunition in good order, were to meet each other still remains to be answered. We have had object-lessons in actual naval warfare between modern fleets in the China-Japanese war, the Spanish-American

war, the Russo-Japanese struggle, each of which has afforded many lessons as to the actual effect of gun-fire, the torpedo explosions upon ships in action, but in each case the fighting has been essentially one-sided, and always for the same reason. The Chinese, the Spaniards, and the Russians stood no earthly chance from the beginning against their opponents because of the corruption either among their officers or the Government officials who fitted them out. It would be ridiculous to doubt that, had the ammunition and equipment of the Russian ships and the discipline of the crews and ability of the officers been equal to that of the Japanese, a very different ending to the battle of Tsu-Tshima would have resulted. It seems quite a platitude to say that the best gun is useless without ammunition, the best machinery of no avail if neglected and rusty, and that neither perfection of armament or abundance of proper ammunition will prevent defeat if in the hands of incompetent or undisciplined men, however brave. For the day of hand-to-hand fighting at sea, of mere brute force and contempt of death as a means of victory is gone, never to return. It still obtains on land, to a certain extent, and probably will continue to do so, but it has nothing now to do with naval warfare.

Therefore, it seems necessary to point out that where modern fleets are equally matched in all the respects just alluded to, the merest accident may decide the fate of the battle—a shell not particularly well aimed, perhaps, but partly directed by the scend of a sea, may strike a great battleship in such a place as to disarrange her internal complexities in such a manner as to put her virtually at the mercy of an

untouched ship. In somewhat the same manner as a slight and perhaps accidental blow upon a certain part of the body of the most powerful athlete, will put him at the mercy of a much weaker opponent, who has the wit to seize the opportunity thus offered. This consideration, however, leads to another—the value of smartness in sea warfare. This has always been held of the highest value in our Navy, and rightly so; for it is evident that where a single shot may have such tremendous results, it is of the highest importance that the side which can fire the quickest and straightest must have the best chances of success.

In the training of our men, too, we have made splendid strides during the last twenty-five years. The old rollicking tar, who could and would fight, but who regarded education as a thing unattainable and unnecessary, has vanished into the limbo of forgotten things, and we have now a personnel in the Navy of higher training and also fighting force than any other country, with the possible exception of Japan, can boast. This, of course, is of the greatest importance in view of the fact that in no other profession are men called upon to handle such vastly complicated machinery under such terrific conditions; and it is quite gratifying to know that our rulers are fully alive to this fact, and are doing all that is in their power to raise the standard of education as well as mechanical skill among the men of the Navy. But, after all, important as all this is which we have glanced at so hastily, it forms but a part of what the sea means to Great Britain.

WHAT THE OCEAN MEANS TO GREAT BRITAIN (*Continued*)

If it be said, as it may well be, that in what I have written about the Navy I have given no details, I can only reply that to those who wish to know what they ought to about the mainstay of our defence against foreign aggression, there are many books upon the subject compiled with the utmost skill and research, such as the works of H. W. Wilson, the late Sir William Laird Clowes, and Fred T. Jane, to name some of the foremost of modern writers who have striven to explain the Navy to landsmen. In a series of brief sketches like these it has been only possible to give outlines, but I do sincerely hope that those who do me the honour to read what I have written will be so interested in the subject that they will be impelled to read up for themselves works treating its various aspects at proper length and in exhaustive fashion. It must, however, be admitted that in the later development of the Navy under the wise and energetic rule of Sir John Fisher, progress has been so very rapid, and revolutionary events have followed one another so swiftly, that naval historians have not as yet had time to bring matters up to date, and therefore I may venture to summarize briefly up till the time of

writing what has been accomplished during the last few years.

One of the first as well as one of the most revolutionary acts of the New Board of Admiralty, with Sir John Fisher as First Sea Lord, Lord Selborne as First Lord, and Mr. Arnold Forster as secretary, was to abolish at one stroke all the obsolete or even semi-obsolete ships which had made so big a show on paper, but were useless for modern warfare when opposed to the newer vessels. It was a bold stroke, involving an apparent waste of millions of money, but in reality it meant a great saving, since to keep each of those obsolete ships seaworthy, not battle-worthy, meant enormous and wasteful expenditure. Another far-reaching edict was that which consolidated our existing fleets at the best strategical points, such as the Straits of Gibraltar, the Cape of Good Hope, Singapore, and the English Channel. The scattered squadrons of inefficient ships were recalled and their cost saved; for, in the first place, they could not uphold the might of Britain if it were necessary, and, in the next, there was no possible combination of circumstances which could render their services necessary in such places as the west coast of South America, the Canadian coast, or even the West Indies, the days being gone when brag took the place of efficient force. Another splendid achievement was the keeping of all the efficient ships of the Navy ready for service, with nucleus or skeleton crews on board, so that although in harbour and really out of commission they might be mobilized in the shortest possible time.

But those epoch-making changes in the disposition of the ships were not more important than others

made for the better training of officers and men. The embryo officer was to be caught young—at the age of twelve, and from the beginning trained for his arduous duties instead of wasting three or four of his most valuable years in public schools, this in most cases only unfitting him for his life's work. The men, too, were given to understand that only those who really took an interest in their work, and were not merely content to mark time, were to be allowed to remain, the inefficients were to be weeded out. And a new spirit was developed by judicious appreciation of straight shooting with big guns, the most necessary of all accomplishments for the naval artillerists, and one that should need no explanation whatever. Of course, there have been many other alterations and rearrangements carried out with a bold hand and a far-reaching policy that should excite our utmost admiration, if we were given to considering how intensely essential it is that we should be masters of the sea. But it will not, I fear, cause nearly as much thought in the mind of the ordinary reader as the chances of a bridge tournament, a golf match, or a football contest, to so great a depth of criminal carelessness have we descended. And it cannot be said that these vast reforms, the evolution of the forward naval policy, involving many millions of money, and the greatest interests of the race, have excited anything like the interest to which they are most justly entitled.

And now we must return to the Mercantile Marine, which we left the consideration of some time back, after having followed up its development to the beginning of the last twenty years. This period marks the greatest industrial development of shipping that the

world has ever known, the impetus being derived from three sources, if not four, at once. The use of steel for shipbuilding, the rapid improvements in methods of steam propulsion, the sudden and immense growth in the size of ships, and the increasing need of our teeming populations for the cheap food produced in such enormous quantities by the opening up of new lands. The fourth, if it be not called a controversial subject such as I wish to avoid, was the position of this country as the only home of free imports, which could only be balanced in our favour by our maintaining our position as the principal carriers of the world's goods. And each of these developments give a striking object-lesson in what the ocean means to Great Britain, if only our citizens generally would heed it; but of that more presently.

First of all, the epoch-making inventions of Bessemer and Siemens for the production of immense quantities and in great masses of mild steel with its superior strength and greater workability, made the building of very large ships possible. Working hand in hand with the steel makers, marine architects soon left that prematurely born leviathan, the *Great Eastern*, far behind, for they combined strength with symmetry and speed and economy. It was soon found possible to convey in a wonderful short time in one ship the produce of a county across the oceans, and deliver those products in perfect condition upon our shores. One ship especially fitted for the purpose will carry the frozen carcases of a hundred thousand sheep from the Antipodes to our ports, bringing as well a couple of thousand tons of cheese, butter, and grain, and landing it in almost miraculous fashion as regards

rapidity, while its distribution among the waiting millions at home is only comparable to the melting of snow under a blazing sun. Other ships carry whole herds of cattle, a trade that from being at first full of cruelty has now by dint of careful planning of ships become far easier for the cattle to bear than long journeys by rail, or driving them along country roads. Of course, there has been a vast difference between the types of ships employed in the various trades. For the mighty floating hotel carrying a couple of thousand passengers and a crew numbering several hundreds, a vast amount of space was necessary for passenger and crew accommodation, for the enormous installation of boilers and machinery necessary to drive a mass between twenty and thirty thousand tons in weight through the waves at a rate of from eighteen to twenty-five miles an hour, and for the two or three thousand tons of coal necessary to energize those engines. Such vessels in themselves represent a capital of from a quarter to three-quarters of a million pounds sterling, without counting the cost of their upkeep; and when it is remembered that some shipping companies, such as the White Star, the Cunard, the P. & O., Royal Mail and Orient Lines, will own and run from half a dozen to twenty or thirty of such vessels, it will easily be understood to what enormous dimensions the shipping trade must have grown. And yet the great passenger lines, of which I have only named a few in the first rank, represent only a very small proportion of the immense number of British ships afloat, and being added to at the rate of a million tons or so each year.

The cargo-carrying steamer of economically slow

speed, that is to say, of from ten to fourteen miles an hour, represents really the backbone of British commerce, and it needs only the merest glance at a publication like Lloyds Register of Shipping to realize how vast are the number of hostages to fortune which we have given; in other words, how vital *is* the possession of an overwhelmingly strong British Navy to protect our commerce scattered over every ocean of the globe. I am not now concerned in the controversy whether, given sufficient reason, therefore, we could not produce from the soil of these islands sufficient food to feed our teeming populations—personally, I believe that we could do so; I only state a fact which should be well known to all persons old enough to think, that in the event of war with a first-rate power, five-sixths of the population of these isles would be starving within a fortnight should our Navy fail to protect our commerce. Nay, we should begin to feel the pinch the moment that war was declared, and that in a way that no other nation would, for the price of food would immediately rise to an inordinate height and the consequent suffering would be terrible. I remember very vividly at the time of the Penjdeh scare when, had we gone to war with Russia, our command of the sea would never have been even challenged, except by privateers preying upon our isolated ships, that the very rumour alone sent up the price of wheat *in the* case of the cargo of the ship in which I was sailing nearly two shillings a bushel, much of which rise was, of course, the work of unscrupulous speculators; but still there would have been an undoubted increase in the price.

Hitherto I have only dealt with the food aspect of

what the ocean means to us Britons, food being the primal necessity; but when food must needs be brought from over the sea it must needs be bought and paid for also. If food is grown or produced in the country it may be exchanged for labour, but in the case of imported food this direct exchange of labour is of no avail. Therefore we need enormous imports of raw material for our manufactures in order to employ the army of workers who have no means of cultivating the land. Every land is drawn upon for this raw material, and in the importance of its free inflow it is scarcely second to the importation of food. It is true that in the immensely valuable items of coal and iron, by means of which we have attained and keep our position as the premier shipbuilders and shipowners of the world, we have our own great resources within the land; but even then we import vast quantities of ore from Spain and Norway and Sweden. Then when these raw materials are worked up into the finished articles by the skill and industry of our workers, our ships come into requisition again to carry them to whatever nations will buy. But not only are our ships thus employed for our own needs, but they also have the greatest share in international ocean commerce, carriers for the world, and earning vast sums thereby. What those sums are may be faintly guessed by the following figures for the year 1904, which I may be forgiven for quoting in view of the importance of the subject. Our aggregate tonnage of merchant shipping is 10,500,000, the total value of our imports £596,500,000 sterling, and of our exports over £417,000,000. And in the same year 1904 we spent £41,696,313 on the Navy, not a high insurance premium on so vast a property.

The shipbuilding figures are much more up-to-date, and break the record. During 1905 we built 1266 vessels of an aggregate total of 1,824,750 tons, this output being 14,000 tons more than the previous maximum in 1901. A tremendous amount of this tonnage has been for foreigners, 21·5 per cent. of the total, so that we are engaged in forging the weapons wherewith we may be fought in our own field.

But within the last twenty-five years we have seen a most formidable rival in shipping matters arise, which has not only entered into keenest competition with us, but has in many cases wrested from us whole lines of trade in which we once were supreme. Not only so, but this rival, Germany, which has built up the two greatest shipping companies, has actually beaten us in one most important matter, that of owning the fastest passenger ships across the Atlantic Ocean. Our other competitors, France, the United States, Scandinavia, all put together do not press us so hardly as does Germany, a country which so short a period ago as a quarter of a century was scarcely worth our consideration at all. But Germany's watchword is thoroughness in all things, and while her internal industries have made gigantic strides, it may safely be said that no branch of her multifarious energies has received such careful fostering, such minute attention, as her shipping. While with us the shipping interest is a matter of national life or death, in Germany it is, however important, a side issue; yet Germans, from the emperor downwards, devote such energy to furthering their shipping interests as should put us to shame if we thought about the matter as we ought. Nothing stranger in national affairs has ever been witnessed

than the apathy of Britons where shipping is concerned, in contrast with the intense interest manifested by Germans in all that concerns their shipping affairs. They have been rewarded, too, by seeing German shipping make colossal strides, and they are beginning to believe that they are destined to occupy the place so long held by Britain, owing to her inability to rise to the occasion and keep the advantage she has had. It is only just to add that the Germans have worked hard for what they have, letting no opportunity slip, and following in our footsteps all over the world, imitating British goods and trade-marks, taking advantage of British free trade, leaving, in short, no stone unturned to win away from us what we are too apathetic to hold on to.

There are not wanting signs that Germans have long regarded British supremacy in the world's traffic as a matter for their undivided national attention, and that the whole of their policy is directed to one end, which is the abasement of Britain, which they believe to occupy now a place that is theirs by right. But it must be said that if ever they do succeed in this perfectly legitimate aim of theirs, it will be entirely our own fault, because we have not realized what the ocean means to Great Britain. The leaders of political thought in Germany look with sardonic satisfaction at our petty political squabbles at home; at the amount of energy which is wasted over things which do not matter; at the ever-increasing number of our men who grow up untrained, unfit for work, a drain upon the country's resources instead of an addition to her strength; and while they do this, they frame pacific addresses to our professors and litterateurs

avowing their persistent friendliness to us and their altruistic intentions towards Great Britain. Unfortunately for these aims of theirs, the virulent German press, directly representative of German feeling towards Britain, cannot restrain itself, and so affords us a splendid barometer whereby we may judge the conditions of the German mental atmosphere as it affects us. Again I say that I do not blame the Germans; if they succeed in their efforts to destroy Great Britain's place among the nations, it will only be because Britons have become unworthy to hold that place. As I write, comes the news that German school-teachers instruct their scholars to bring money for the purpose of building ships to beat the British Navy; this is done by order, and is a lurid comment upon German professions of amity.

It may be here remarked that every effort on the part of any nation to extend her commerce at sea must of necessity affect Britain chiefly, since, at the risk of repetition, it must be stated that Britain and sea-supremacy are correlative terms—one cannot exist without the other. The United States have challenged us in no uncertain terms, but unlike the Germans, who plod steadily on towards a goal never lost sight of, the Yankees have endeavoured to buy the supremacy of the sea. There is no need to labour the point. The experience of the International Shipping Combine, directly aimed at the heart of Britain's shipping trade, is an object-lesson in the futility of the methods employed. There are many things that money cannot buy, and it is evident that a command of the world's shipping industry is one of them. I do not think we have anything to fear from American competition at

sea now, in whatever form it may come. I have very much more reason to dread the persistent and scientific efforts of a much later entrant into the lists of the struggle for sea-power in the direction of commerce. I mean Japan. I foresee a day not very far distant when Japan will rule the Pacific by sheer ability. The same intensity of industry, of attention to detail, and of national devotion to a national ideal which Japan has manifested, in a degree never before witnessed, during her wars with China and Russia, she will show, she is showing, in her application to commerce. Japan is a small nation, but she has at her hand, and amenable to her tuition, a vast unknown quantity, China. She will undoubtedly energize China; will utilize the almost appalling capacity of the Chinese for patient labour and imitative ability; and, without the necessity for shedding one drop of blood, she will dominate the East in the interests of the yellow races. Here is the real yellow peril, if peril it really be. Not that the yellow race will carry fire and sword Westward, destroying all the evidences of Western civilization, but, by the most peaceful of methods, by bettering the teaching they have received from the Western nations, they will simply crush the Westerner back to his own countries, and defy him to do any trade with the Far East at all. In this gigantic struggle all the Western nations will suffer alike; but the most direct antagonism will be with America, which is perhaps the most hated of all the white races by the yellow man for the restrictions placed by the United States upon Mongolian immigration. But America will, doubtless, owing to her enormous population and wealth, be able to speak

with the enemy in the gate effectively. But for our Australian colonies I have the greatest fears. I do not see how, when to Oriental ability, patience, endurance, and thrift is super-added Western skill and knowledge, it will be possible for our well-paid, well-fed, and luxury-giving countrymen down under to compete with it. It will certainly soon be impossible to enforce the exclusive laws already obtaining, and once Australasia is open as an emigration field to China and Japan, the deluge is upon them. I hope I am taking far too gloomy a view of the future, but I feel sadly that I am not.

One thing, however, I would like to insist upon and hammer away at with all my might, caring nothing for the risk of being voted a nuisance. It is that steps should at once be taken to impress upon all our citizens the absolute (by no means relative) importance of the ocean to us. It is our natural highway, the only place outside of our own dominions where we are free to go and come untaxed, and if by any succession of untoward events we should lose our right to range the ocean freely, we should then have to ask leave to live at all. A matter so vital to us all should certainly be taught at the earliest possible age in our schools, and large maps, similar to the Navy League map, be hung in all schoolrooms for the youngsters to look at, while half an hour or so every day should be devoted to homely lessons, impressing upon the scholars what our position really is, and how entirely dependent we are upon the sea for our life. Is this being a faddist? I think not; but if it be considered so, I will gladly be called a faddist if allowed to uphold it. Another point which I earnestly wish to see taken up is that our great

newspapers should devote at least a column of their space daily to shipping matters, which might be made intensely readable as well as interesting, while of the educational value of such reading there can be no room for difference of opinion. The country possesses many shipping papers, all valuable in their way, but not accessible to the mass of people, nor would the information they give, valuable as it is, be at all intelligible to the ordinary reader unless it were carefully edited and often translated. If it be pleaded that the pressure of the other news keeps shipping matters out, I reply that in a properly edited paper this could not be. I have repeatedly seen news of the utmost interest and importance trampled upon, crowded out, in order to give a full report of a spicy divorce case or a breach of promise case or criminal prosecution, affecting at the most but a handful of people, but put in from a mistaken idea that the human interest in such drivel is what sells a paper. I do not believe it, and if it were true, then it is the mission, the duty of the newspaper, if it possesses a tithe of the educational value claimed, and, I believe, rightly claimed for it, to teach the people what they ought to read by giving it to them.

If only the public mind were awakened to the fact of our utter dependence upon the sea for our living, it is unthinkable to suppose that they would calmly acquiesce in the fact of our Mercantile Marine being so very largely manned and handled by foreigners as it is. This question has been before the public now for a good many years, but it is just as far from settlement as ever. A great deal of money in the form of subscriptions has been, as I think, wasted over this

matter. What is wanted is an awakening of the public opinion to its importance, and this cannot be done by spasmodic outbursts in the press, a flare-up for a few days, and then a going to sleep again for months, as has hitherto been the case. However, I gratefully admit that there have been signs of late of an awakening on the part of the press to a sense of the responsibilities in this matter which gives promise of better things to come. I feel sure that the heart of the people is sound enough, and that if only we could be made to understand that this question of our sea-supremacy is as vital to us as is the issue of a great war, nay, that there is a great war being waged mercilessly upon our chief interest by foreign nations, with the never-fading hope of getting the upper hand, we should soon see what is most earnestly to be desired, the great mercantile marine of our country placed upon a national footing, lifted into its proper position in the eyes of all men as the one thing which concerns every one of us, and in the maintenance of which, at the highest possible pitch of efficiency, no effort, national or individual, should be neglected.

But perhaps it may be as well to leave this side of the question for a little while and say just a word or two upon the commercial aspects of shipping, which to most of us are a sealed book. The day of the individual shipowner, who could do as he liked with his ships, and who in many cases was like a father of a very large family, is nearly, if not quite, gone. Shipowning is now almost entirely in the hand of limited companies of varying degrees of stability, from such gigantic affairs as the Peninsular and Oriental, with their mighty fleet constantly being

renewed and their steady dividends of ten per cent., down to the little single ship company with a capital of £10,000 invested in an almost worn-out cargo steamer, which has to fight for a bare existence. The great companies conduct their businesses on lines savouring more of the government of a kingdom in their widespread ramifications, with their lordly representatives all over the world, and their host of well-paid servants ashore and afloat. The enormously costly matter of insurance does not trouble them much, for, in the first place, by having ships and men of the very best at lavish cost they reduce their risks, so that by placing in a fund all the premiums they would have to pay for insuring their ships, experience has shown them they are enabled to build a new ship every now and then, after having paid for all losses and damages. Of course, this method is only open to a firm that has many ships, off every one of which is written a goodly amount each year for depreciation, while they are so well looked after that, though twenty years old, some of them are just as good and efficient as new. I have named one company, but there are many others who are in just the same position, but about which we do not hear so much; indeed, it may be doubted whether in the whole history of shipping there has ever been known such a marvellous record of prosperity as belonged to the White Star Line before its purchase by the Americans. With a capital of £750,000, it owned ships valued at several millions, which had been written down in the books till they stood at nothing, while the shareholders had been receiving dividends all along ranging from twelve to twenty per cent.

But when we leave these leviathans of shipping

and come to the smaller fry, whose numbers are legion, we are in a sea of perplexity.

Some of the smaller companies, honestly managed, and faithfully served because the servants are decently treated, are exceedingly prosperous. Life in them is hard, for they are not floating hotels by any means, nor are the rates of pay for the officers high—the wages of the men are practically the same in the smallest tramp as in the largest liner. But still there is honest dealing and a fair amount of satisfaction all round. When, however, we leave these we come to the real tramp, the cheap tank, under-engined, under-manned, and under-paid, run by the managing owner, who is also a broker and taxes everybody, from the master who must invest his hard-earned savings in order to get a command which is worth £12 or £15 a month, and who knows that to inquire after a dividend is to get the sack (vulgarly speaking) without being able to realize his investment, to the country clergyman or maiden lady who has been led by specious promises to invest their little all in shipping. This form of shipping enterprise is of no use to the country, it is more of a curse than a blessing, but unfortunately it fills a very large space in our mercantile marine.

Another vast change has been brought about in shipping matters by the almost universal extension of the telegraph cable, as well as by the establishment of brokers' offices in practically all the ports of the world. This has shorn the master of much of his responsibility, and vastly limited his power of making a little extra on his scanty pay. In almost every case nowadays the master is solely concerned with getting his ship to port in safety and good time. As soon

as she is in harbour, all business connected with her freight is taken out of his hands by the agent or broker, and he has but to obey orders, instead of, as of old, hobnobbing with shippers, and using all his endeavours to scare up a cargo, as they say, and get away to sea again as soon as possible. But by the operation of a universal law, that applies afloat as well as ashore, the harder and more onerous the duties of the mariner, the lower his pay and consideration. In a great liner the master's duties are very light indeed. His responsibility is tremendous, but all actual detail work is taken off his hands by a thoroughly competent staff of officers, several of whom are as fully competent to command as he is himself, and, being very anxious to rise, are not at all likely to shirk their duties. The purser attends to the clerical and commercial part of the work, and so the master, who from his sublime altitude may look down upon his brother master in a tramp steamer of a tenth of the tonnage, with a sixth of the pay and ten times the work, may be congratulated upon his position as being a highly honourable and fairly easy one.

The cruel and unjust thing about the profession is that for such men a single mistake on their part or that of one of their subordinates may, and very often does, spell utter ruin. It is the rule of some companies, and it is the unwritten custom in most, that nothing excuses an accident: the master must go, faultless or not. And if he be past middle age, with a family dependent upon him and only a trifle saved, his career is over, for except in the worst and lowest kind of tramp, where such a man's necessities are taken advantage of to get him at starvation wage,

he cannot get employment even as a subordinate officer. It is the only profession among us where an error of judgment or an absolute misfortune is construed into a crime worthy of ruin after a blameless career, and its victims are rightfully very bitter about their treatment. But it cannot be gainsaid that the tremendous penalty attaching to failure has made our Mercantile Marine what it is, and has kept down our list of disasters at sea, reducing it each year until sea traffic compares very favourably with railway work, for instance, in its immunity from loss of life.

Here I must close this discursive chapter, with the earnest hope that those who do me the honour to read it will first of all take home to themselves, and then endeavour to impress upon all with whom they come in contact, the transcendent importance of the ocean to our beloved country, Great Britain.

THE END

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